the OIL AND GAS JOURNAL

Science Library

MAR 1 2 1946

ALL FOR ONE!

There's no letup for oil field equipment. It looms large in the building of an even more productive America—all industry's goal. As much as ever, therefore, you need the firm grip on wire line operations that *Preformed* Yellow Strand provides. Let its stout steel wires handle your heavy drill strings securely. Use its limberness to speed pipe-laying . . . to fight fatigue on winches . . . to simplify erection jobs. The long-lasting wire line is the *economical* line. Specify *Preformed* Yellow Strand by name.

Broderick & Bascom Rope Co.
St. Louis

Houston Branch: 1311 Palmer St.

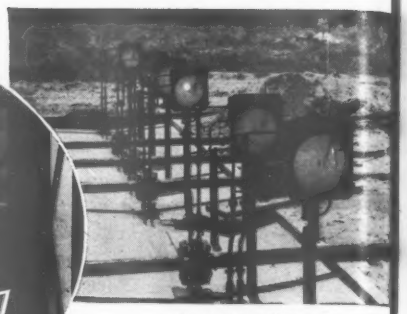
THE CONTINENTAL SUPPLY CO.
Mid-Continent Distributors
Stores Located in All Active Fields

THE REPUBLIC SUPPLY CO.
of California
Oil Field Distributors for Calif.

THE McJUNKIN SUPPLY CO.
Charleston
West Virginia

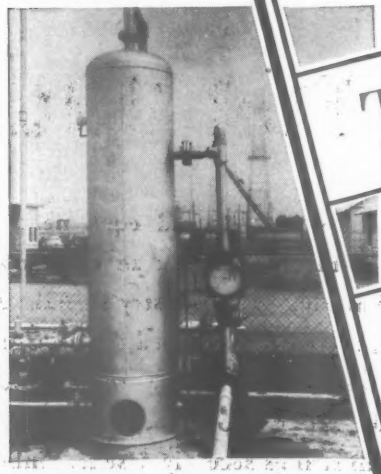
Gasoline Plant Measurement
At Intake Headers

Measurement To
Fractionating Column



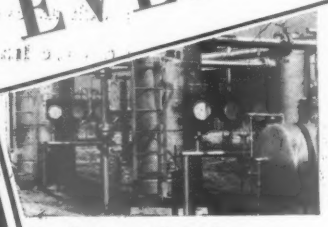
Repressuring Station
Measurement

HERE
THERE
EVERYWHERE



Metering From Oil Field Separator

Mixing Header Measurement



Measurement To and From
Absorbers and Stills

Panelboard Installation
In Field

Gulf
Field Installation

Metering On Intake
Headers

EMCO-McGaughy Integr
Mechanically computes
fice meter charts with
and accuracy.

EMCO RIFICE *Meters*

PITTSBURGH EQUITABLE METER DIVISIO
ROCKWELL MANUFACTURING CO.
Atlanta Boston Main Offices: Pittsburgh 8, Pa. Chicago Houst
Kansas City Los Angeles New York Pittsburgh San Francisco Seattle Tu

the OIL AND GAS JOURNAL

published weekly by the

PETROLEUM PUBLISHING COMPANY

211 S. CHEYENNE AVE., TULSA 1, OKLAHOMA

Subscription rate to the petroleum industry, United States and foreign, 1 year, $3.00. Single copies, 20 cents. Back copies, when over a year old, 50 cents. Note: Payments from outside the U. S. A. may be in the form of an international money order or check on a U. S. A. bank. Entered as second-class mail matter at Tulsa, Okla., under Act of March 3, 1879.

Copyright 1946 by The Petroleum Publishing Co.

Vol. 44, No. 44 March 9, 1946

P. C. LAUINGER, *President* — C. O. WILLSON, *Editor*

S. H. ROURKE, *Business Manager* — H. STANLEY NORMAN, *Managing Editor*

R. C. MAC DOUGALL, *Circulation Manager* — ARCH L. FOSTER, *Refining Editor*

W. L. NELSON, *Technical Editor* — PAUL REED, *Pipe-Line Editor*

Associate Editors

LYNN M. NICHOLS — NEIL WILLIAMS

CHARLES J. DEEGAN — KENNETH B. BARNES

R. B. TUTTLE — D. H. STORMONT

District Editors

HERNDON DAVID, Tulsa 1, 211 S. Cheyenne Ave. — DAHL M. DUFF, Tulsa 1, 211 S. Cheyenne Ave.

TOLBERT R. INGRAM, Denver 11, 4556 Alcott St. — E. H. SHORT, JR., Houston 2, Sterling Bldg.

HENRY D. RALPH, Washington 4, Natl. Press Bldg. — L. P. STOCKMAN, Los Angeles 14, Union Oil Bldg.

FABIAN R. STALEY, New York 17, 415 Lexington — WARREN W. BURNS, New York 17, 415 Lexington

VICTOR LAURISTON, Chatham, Ont., 35 Stanley Ave. — O. C. PRESSPRICH, Saginaw, News Bldg.

GEORGE H. WEBER, Dallas 1, 913 St. Paul St.

Advertising

WAYNE RIVES, *Manager*

KENNETH J. LANGLEY, *Eastern Manager*, New York 17, 415 Lexington Ave. — CHARLES A. WARDLEY, *Pittsburgh Manager*, Pittsburgh 19, Grant Bldg.

C. R. FARMER, *Chicago Manager*, Chicago 2, 105 W. Madison — J. HOWARD TINKHAM, *California Manager*, Los Angeles 15, 1408 S. Grand Ave.

J. V. PENNINGTON, *Gulf Coast Manager*, Houston 2, Sterling Bldg. — A. J. CHAMBERS, Beckenham, Kent, England, 33, The Avenue

MITCHELL TUCKER, *Manager, Research Dept.*, Tulsa 1, 211 S. Cheyenne Ave. — JOHN D. REILLY, *Production Manager*, Tulsa 1, 211 S. Cheyenne Ave.

Member
Audit Bureau of Circulations
Associated Business Papers

Table of Contents

NEWS DEVELOPMENTS

Report Urges Immediate 35-Cent Increase in Crude Price 44
Determined Fight Launched to Free Oil of Price Control 44
Sinclair Sees End of Anglo-American Oil Pact 45
Second Article Presented in New Refining Series 45
Journal's Pipe-Line Editor Nears End of Latin-American Trip 46
Navy Releases Five More Refineries 46
Navy Pleading for More Oil 46
Change in State Allowables Doubted Despite Bureau's Figures 48
American Crude Production to Remain Low for Long Period 48
Midwest Markets Steadier While Gulf, East Coasts Soften 49
Independent's Position Due for Airing 49
Ten-Year Forecast of World Oil Picture Is Optimistic 50
International News 51
Bolivia Awards Contract for 255-Mile, 6,000-Bbl. Pipe Line .. 52
Petroleum Division A.I.M.E. Planning Increased Activity 53
Pauley Hearings Will Be Resumed 58
Consumers Show Preference for Natural-Gas Fuel 121

Editorial 43
This Week 47
Deaths 58
Refining News 95
Pipe-Line News 98
Natural-Gas News 100
Natural-Gasoline News 100
Statistics and Trends 102

ENGINEERING AND OPERATING

World's Largest Derrick "Walked" Across Texas Sand Dunes 60
Selecting a Rotary Pump 63
Book Reviews 65
Identifying Hydrocarbon Mixtures 66
Townsite Drilling Campaign Latest Event in Cement Pool .. 70
Modern Refining Processes—Part 2 76
Questions on Technology 85
Carbon-Black Industry Strains to Meet Rubber Requirements 86
Engineering Fundamentals 91
The Refiner's Notebook 93

EXPLORATION AND DRILLING

Weekly Well-Completion Record 102
Daily Average Production for Week 103
Outlying Areas Show Prospects 105
Reports by Areas Start on Page 105

ADDITIONAL FEATURES

Market Summary 102
Crude-Oil Prices 102
Drilling Contractors 122
Personals 124
Equipment Men in News 126
Classified Advertising 127
Events on Calendar 130
Index to Advertisers 130

BAKER MAGNESIUM ALLOY CEMENT RETAINERS

THEY ARE INDISPENSABLE FOR . . .

- **RE-CEMENTING**
- **SQUEEZE JOBS**
- **CEMENTING BEHIND SECTIONS OF PIPE**
- **TESTING UPPER CASED FORMATIONS**
- **REDUCING GAS/OIL RATIOS**
- **CEMENTING BAD PIPE**
- **PLUGGING OFF BOTTOM FLUIDS**
- **CEMENTING OFF TO PERFORATE FOR PRODUCTION**
- **CEMENTING TWO STRINGS TOGETHER**
- **CEMENTING LOW PRESSURE ZONES**

DEVELOPED and pioneered before the war, production was deferred due to the scarcity of vital magnesium. The Baker Magnesium Alloy Cement Retainer now offered is completely successful for practically every type of service, and the demand for it is rapidly increasing.

Baker Magnesium Alloy Cement Retainers are easily drillable, and the only larger size parts not made of magnesium are the slips. These are made of nitricastiron and are readily broken up. They can be drilled up by using 2-inch tubing, drill pipe, or cable tools.

Baker Magnesium Alloy Cement Retainers can be used for short periods of time as temporary bridge plugs, but are not recommended for permanent bridge plugs. They are not so low in purchase price as the cast iron type, but the overall cost of results is much less.

For additional information on BAKER CEMENT RETAINERS—made either of Magnesium Alloy or Cast Iron—consult the nearest Baker office or representative for courteous and intelligent attention and suggestions. There is no obligation.

CENTRAL DIVISION 6023 Navigation Blvd Houston, Texas Mail Address Box 3048 Phone Wayside 2107
ARKANSAS Magnolia—Phone 980 • ILLINOIS Onley—Phone 482 • KANSAS Great Bend—Phone 1082 • LOUISIANA Harvey—Phone New Orleans Exchange Uptown 3966 • Scott—Phone Lafayette Exchange 2219-W • Shreveport—Phone 7-5512 • MISSISSIPPI Laurel—Phones 327-M—1793-W • Natchez—Phones 181—1750 • OKLAHOMA Shawnee—Phone 3928 • Tulsa—Phone 2-8083 • Edmond—Phone 492 • Norman—Phone 723 • TEXAS Corpus Christi—Phone 2-2251 • Houston—Phone Wayside 2107 • Kilgore—Phone 688 • McAllen—Phone 459 • Odessa—Phone 293 • Victoria—Phone 314 • Wichita Falls—Phone 2-4776
GENERAL OFFICES 6000 So Boyle Avenue Los Angeles Mail Address Box 127 Vernon Station 11—Phone JEfferson 8211

THE OIL AND GAS JOURNAL

Full Information

LAST week we commended the action of the Texas Railroad Commission in reducing the March allowables of that state substantially. Oklahoma also lowered its output, and it was hoped that the national reduction would total at least 400,000 bbl. daily. Curtailment in field output was necessary in order to correct a gasoline situation in which stocks had become excessive and markets weak. The approved operations were in line with the Bureau of Mines estimates of demand.

Now the government bureau has increased its March estimates for the two states. There has also been some criticism by operators of the original reductions. All this adds to the confusion of an already muddled demand-supply situation to which answers must be found quickly.

Previous to the war, the petroleum division of the Bureau of Mines supplied the industry with monthly projections of demands which were generally followed by the conservation units of the oil states. These estimates were determined from analyses of trends in gasoline consumption.

Under this program the operations of the entire industry centered in the seasonal and yearly changes in motor-fuel requirements. The record reveals the limitations of this method of balancing supplies and demands by states, but it served the purpose for which it was intended. The work of the Bureau of Mines was generally commended.

Since the war, gasoline is not the barometer of conditions that it was over a period of two decades. This is due both to changes in demands and refinery processing methods. Industrial and marine consumption of fuel oils and diesel oils has greatly expanded. Burning-oil requirements have increased in many markets. While motor-fuel consumption since V-J Day has been greater than expected, current data and projections over the next year or two reveal the results of the war stoppage in motor-car production. Some of the changes from prewar conditions are probably temporary, but others will become a permanent part of a new era in oil operations.

The industry must have reports which accurately measure these temporary and permanent changes in demands. It must avoid duplicating developments of the past 4 months, during which there has been a shortage of intermediate and residual products despite a 28-million-barrel reduction in stocks while 30 million barrels were added to gasoline inventories.

More needs to be known about the details of imports and exports. Important developments have taken place or are in the making in all divisions of oil operations outside this country. Timely information on these activities as regards consumption is necessary in establishing the month-to-month pattern of domestic operations. Only an industry fully advised as to the needs of its customers can chart a sound course.

OPA Authorizes 10-Cent Advance In Crude-Oil Ceiling Price

by Henry D. Ralph

WASHINGTON.—An increase of 10 cents per barrel in the ceiling price for crude oil was authorized here this week by Office of Price Administration. The increased ceilings will become effective some time during the latter part of March.

Thus, OPA answered the industry crude-oil producers advisory committee which had recommended a raise of 35 cents per barrel in ceiling prices to cover higher costs of discovering and producing petroleum.

Refiners, OPA explained, will be required to absorb the advance, if purchasers elect to lift postings to the ceiling. "No price changes to the public," an OPA statement declared, for gasoline and other products "are contemplated at this time." OPA said, however, that the effect of higher crude-oil ceilings on retail prices "will be the subject of meetings with the national refiners' industry advisory committee to begin at once."

The 10-cent advance was the first break in crude-oil price ceilings since start of World War 2. Projected on the basis of 1946 production of about 1,500,000,000 bbl., the relief now granted will mean an additional $150,000,000 annually to producers.

The national average ceiling price for crude is approximately $1.23 per barrel and later this month it will become $1.33.

Before the OPA announcement was made March 5, a report from the industry producing advisory committee originally filed February 11 was released.

The report declared:

"1. The average cost of finding, developing, and producing crude petroleum rose from $.70 per barrel in the years 1936-39 to $1.60 per barrel in 1944, whereas gross income per barrel was $1.24 during 1944.

"2. During the base period 1936-39 the average excess of crude-oil income over replacement cost was $.45 per barrel but in 1944 replacement cost was $.35 greater than gross income.

"3. An average price of $1.99, exclusive of subsidy, would have been necessary in 1944 in order to have maintained the base period margin of $.45 per barrel and, on the basis of replacement cost for that year, to have provided the industry with the funds required to replace the volume of oil produced with an equal volume of newly discovered and developed reserves."

Declaring that industry experience shows several moderate increases are preferable to one large increase, the committee recommended an immediate rise of 35 cents and periodic reviews looking to further increases in the future.

The committee referred to the oil industry's position favoring removal of all price restrictions and declared that maximum efficient production capacity is now in excess of estimated demand for crude, but noted that its assignment was confined to changes in present price ceilings. It also noted that it has no jurisdiction over products prices but observed that ceilings on refined products would have to rise if its recommendations are adopted.

The findings were based on analysis of cost-survey data obtained by OPA last spring, plus other information gathered by the committee. OPA was reluctant to have the cost survey used on the ground that it was not a representative sample of the industry, but the committee report contended it was adequate when properly interpreted but that fair and equitable prices for crude cannot be determined from bookkeeping data alone. It also reiterated its standing contention that consideration of replacement cost data is necessary in determining fair and equitable prices.

The report is quite voluminous and replete with charts and statistical tables. The following excepts are typical of the conclusions:

There is a substantially increasing upward trend in the cost of finding, developing, and producing crude petroleum.

Existing price ceilings are insufficient to permit the normal exploratory and development operations needed to provide adequate petroleum reserves. Productive capacity can be maintained only by replacing flush production with a much greater volume of newly discovered and developed reserves.

Determined Fight Is Launched to Free Oil of Price Control

WASHINGTON.—A new determined move to free crude oil and petroleum products from provisions of the Price Control Act is under full swing on Capitol Hill, with House members from the oil states maintaining that they have a better chance for relief than at any time in the past.

The campaign got under way when a group of independent oil operators from Texas met with a Congressional delegation yesterday to discuss strategy.

Hearings are currently being held on extension of the price legislation and a group of congressmen led by Rep. Albert Thomas of Texas, is seeking to be heard by the committee on the petroleum situation before the measure reaches the floor of the House. Rep. Wright Patman (D., Tex.), second ranking member of the committee, is trying to arrange the hearing.

Thomas declared last week that if the bill is presented to the House without a provision for lifting OPA controls over crude oil and products in all cases where supply has reached a balance with demand, the congressional petroleum bloc will attempt to amend the legislation from the floor with a provision that would automatically eliminate controls in such cases.

At the present time, Republican members of the House are known to be preparing an amendment to the bill which would by law remove the powers of OPA over all raw materials and manufactured articles when production reaches a fixed relation to demand. Present thinking is that this point will be based on prewar production levels.

The Republican side with the aid of representatives of oil-producing states would have little difficulty in putting this provision over, and in itself it would immediately remove controls from most petroleum products, since production is already greater than demand.

Chester Bowles, administrator of the Office of Economic Stabilization; John Snyder, director of the Office of War Mobilization and Reconversion; and Paul Porter, newly appointed price administrator, are all on record in favor of the policy that price controls are no longer necessary for any commodity if supply and demand are balanced.

Proponents of the lifting of the

curbs on petroleum feel that this expressed policy strongly improves their position and, taken with the implied threat that they may support the Republican plan, feel that they have an excellent chance to receive approval for their proposal by OPA before the bill is reported out by the committee.

Rep. Overton Brooks of Louisiana said he was in favor of removing all curbs where supply equals demand.

"The most important commodity in this situation now is oil," he declared. "The supply is exceeding the demand and no industry with an oversupply should be controlled and regulated."

Brooks pointed out that some of the refineries have already closed down, that production allowables have been cut in many areas, and that a rate war is impending because of the surplus.

Included in the group of independents who participated in the conference here last week were W. L. Stewart of Fort Worth, who acted as spokesman for the oil men; R. C. Ray and Cecil L. O'Brien of Amarillo; C. J. Oates of Stinnett, and J. R. Phillips of Borger. An additional group of independent operators is expected to confer this week on the same problem.

Sinclair Sees End of Anglo-American Oil Pact's "Troubled Life"

NEW YORK. — Postponement of Senate hearings on the Anglo-American petroleum agreement was interpreted here this week by H. F. Sinclair as possibly "the last chapter" in its "troubled and mysterious life."

Previously, Sinclair, president of Sinclair Oil Corp., issued a critical analysis of the proposed agreement which requires Senate ratification before it can become operative. Text of Sinclair's earlier criticism was published in the February 9 Journal, starting on page 64.

Numerous substantial elements in the petroleum industry have endorsed the Anglo-American treaty. Approval has come from the Petroleum Industry War Council, the American Petroleum Institute and the Independent Petroleum Association of America. A committee of Texas operators has organized to fight Senate ratification and other political bodies such as the Michigan Senate have asked for rejection of the treaty.

Sinclair's Statement

Sinclair's statement when informed that Senate hearings had been postponed, follows:

"What may be the last chapter in the troubled and mysterious life of the Anglo-American petroleum agreement was written Friday when Senator George, acting chairman of the Foreign Relations Committee, announced that hearing on the proposal to ratify the agreement as a treaty set for March 4, had been indefinitely postponed.

"Ralph K. Davies, who took up the task of putting over the treaty when Secretary Ickes retired, said that he had asked for the postponement at the request of the State Department which had not had time to study the agreement. Months have passed since Ickes and Davies brought back from London the revised agreement which has been well described as 'the same old girl in a new dress.' That is, a document just as dangerous and undesirable as the original agreement, so generally condemned that it had to be withdrawn.

"With due respect to all concerned, the reasons advanced for the abandonment of the Senate hearing do not hold water. Of the two principal and only really active promoters of the treaty, Ickes has retired, and Davies must have been aware that he would have faced on Monday a barrage of opposition from lawyers, state authorities, and representatives of the oil industry, and the need to explain which no one has ever done what the treaty really means and why any treaty was needed. If the Senate action marks the end of the attempt to run the oil industry under the mantle of a treaty it is 'good riddance of bad rubbish.'"

Davies Explains Why Delay Requested

WASHINGTON.—Ralph K. Davies, acting petroleum administrator for war, announced March 1 that upon the request of the State Department he had asked Senator George, acting chairman of the Senate Foreign Relations Committee, to postpone hearings on the Anglo-American oil treaty from March 4 to a date to be determined and announced later.

The delay was requested, Davies said, because State Department officials are currently pressed with other important matters, thus making it desirable to defer the oil hearing until a later date.

He stated that oil representatives from all parts of the country, representing both large and small companies, intend to appear as witnesses in support of the treaty, which was signed in London last September 24.

Second Article Presented In New Refining Series

IN this issue, The Oil and Gas Journal presents the second article in the series, "Modern Refining Processes," by George Armistead, Jr., Washington, D. C., refinery technologist and engineering consultant.

Title of the discussion carried in this issue beginning on page 76 is "Factors Affecting Quality of Motor Gasoline from Catalytic Cracking of Gas Oils." A biography on Armistead was published in the March 2 Journal in which appeared first installment of his series. In the entire series the Journal is offering an interpretation of the many refining methods in which development was spurred by wartime necessity, in terms of sound postwar practice.

Wide Range of Subjects

The author has outlined a wide range of subjects to be covered in future articles. Among them are the following:

"Coking of Hydrocarbon Oils."

"Factors Affecting Quality of Catalytically Cracked Motor Gasoline."

"Comparative Economics of Natural and Synthetic Fluid Cracking Catalysts."

"The Maintenance of Fluid Catalytic Cracking Units."

"The Development of the Hydrofluoric Acid Alkylation Process."

"The Desalting of Petroleum Oils."

"The Naphtha Isomerization Processes."

"Yield Relationships in the Gas Reversion Process."

"Modern Practice in the Catalytic Polymerization of Light Hydrocarbons."

"Yield Relationships in the Thermal Cracking of Reduced Oils."

"Thermal Cracking of Catalytic Cracked Gas Oils."

Armistead, who has been closely associated with research and refining operations since his graduation from Texas Agricultural and Mechanical College in 1923, was asked to prepare the series after representative technologists and engineers had suggested he was best qualified to present the material. In the first article in the March 2 issue of the Journal he discussed "Catalytic Cracking for Production of Motor Gasoline."

Journal's Pipe-Line Editor Nears End of Latin-American Trip

PAUL REED, pipe-line editor and engineering staff writer for The Oil and Gas Journal and Petroleo Interamericano, soon will complete a 3-month swing through the more important producing countries of Latin America.

The first report on his observations resulting from visits at the main operating camps and with key engineers in charge of Latin-American activities will appear in the March 16 Journal. His first article will explain the producing, drilling, and exploratory practices applied to the Las Mercedes area, State of Guarico, where The Texas Petroleum Co. and Caracas Petroleum Co., jointly operate through the S. A. Petrolera Las Mercedes. Guarico will receive one of the world's most intensive exploratory campaigns during coming months and the operating practices at Las Mercedes, resulting from experience in completing a total of 23 wells, become even more significant.

Reed is one of the seasoned veterans on the Journal's staff of engineering writers. His particular familiarity with pipe-line design, construction, and operation furnishes valuable background for his current trip. Pipeline systems and other forms of transportation constitute one of the major problems in Latin-American operations. Outlets for many of the newer producing areas and pipe lines required to supply crude oil to new refinery sites in Venezuela and Colombia will receive special attention in Reed's reports, along with methods of operating existing lines.

PAUL REED

Highlights of operating technique in all major fields of Venezuela, Trinidad, and Colombia will be explained in the series of articles. Topics definitely scheduled include articles on research, road building, oil-emulsion treating, rig moving, camp construction, plans for secondary recovery, pumping practices, and a variety of other pertinent titles.

Navy Releases Five More Refineries

ACTIVITY on the oil industry labor front during the week brought a settlement of the Emsco Derrick & Equipment strike in Dallas and the release of five more seized refinery properties by the Navy.

Early this week the Navy was still operating only five refineries and two pipe lines of the 53 which were taken over last October by presidential order to end a strike threat to the nation's oil supply.

Refineries released during the week were Elk Refining Co., Falling Rock, W. Va.; Atlantic Refining Co., Atreco, Tex.; Magnolia Petroleum Co., Beaumont; Pure Oil Co., Smith's Bluff, Tex.; and Ashland Oil & Refining Co., Catlettsburg, Ky. Using the settlement formula of an 18 per cent wage increase and 4 to 6-cent shift differentials, the Navy was striving to bring an end to the disputes at the remaining properties and wind up its control of facilities.

A joint union-management announcement told of the Emsco Derrick & Equipment settlement with the steel workers union. The strike in the Dallas plant had kept 105 C.I.O. workers idle since February 6. Terms provided an hourly wage raise of 18½ cents and a union security clause which a C.I.O. official said was essentially "maintenance of membership."

In Houston, Reed Roller Bit Co. was to begin operating a second shift early this week. The company was closed by the steel workers strike January 21 but reopened February 11. It has operated a single shift since that time. Hughes Tool Co., also involved in the strike, was seeking a price increase.

A survey made in Dallas on Texas work stoppages since January 1 listed among continuing strikes a dispute between Taylor Refining Co. and the C.I.O. oil workers union at Corpus Christi. The survey showed that in 39 stoppages in 14 cities in Texas, 29,951 workers had lost more than $4,000,000 in wages.

Unionization of oil jobber employes in some areas was reported by Joseph D. Hadley, executive secretary of the Michigan Petroleum Association, at a recent conference of the Iowa Independent Oil Jobbers Association in Des Moines. The fact that unions apparently are beginning to aim at small business concerns, he said, is cause for concern.

The National Labor Relations Board ruled that the Independent Union of Petroleum Workers has bargaining rights for certain employes of the wholesale marketing department, southern division, and in the wholesale distribution department, southwest territory, of the Union Oil Co. of California. The ruling followed an election among the workers.

Navy Pleading For More Oil

WASHINGTON.—The Navy department and 32 representatives of petroleum refineries met in Washington March 8 to discuss the serious shortage of fuel oil facing the Navy for the rest of the year.

The refiners met with Secretary James Forrestal and Assistant Secretary John L. Sullivan and were asked for suggestions and advice for relieving the shortage through voluntary industry action to increase production over present commitments.

The Navy estimated requirements are 270,000 bbl. of Navy special fuel oil and 89,000 bbl. of diesel oil per day to carry out commitments for demobilization and other postwar activities during April, May and June.

During January 203,000 bbl. per day of Navy special fuel oil were received from industry, and 73,000 bbl. per day were used from proportional reserve stock.

If withdrawals from stock continue at this rate, the operational stocks of Navy special fuel oil will be exhausted by April 15. The present deficiency of diesel fuel is approximately 23,000 bbl. per day.

Appleman Interest Sold

NEW YORK.—The interest of William Whitman, Inc., formerly National Refining Co., in the Appleman oil and gas leases in Kansas, have been acquired for approximately $670,000 by Standard Oil Co. of Ohio.

THIS WEEK

NATIONAL AFFAIRS—Industry studies significance of postponed Anglo-American treaty hearings. . . . Sinclair interprets delay as indicating proposal will be permitted to die. . . . Sponsors, however, insist treaty is sound, will urge for Senate ratification. . . . Postponement asked by State Department because of attention required by more urgent matters. . . . ¶Pauley's nomination scheduled for final action in Senate this week. . . . ¶O'Mahoney committee will wind up petroleum investigation with 3 or 4-day hearing starting March 19. . . . Long list of industry witnesses scheduled to appear, discuss all phases of operations. . . .

PRICES—Industry advisory committee recommends 35-cent crude advance. . . . Raise necessary to bring postings in line with discovery and producing costs. . . . ¶Product markets in Midwest growing steadier, at lower levels. . . . East, Gulf and Pacific coastal motor-fuel prices soft. . . . ¶Independents launch determined fight to eliminate control of petroleum prices from OPA. . . .

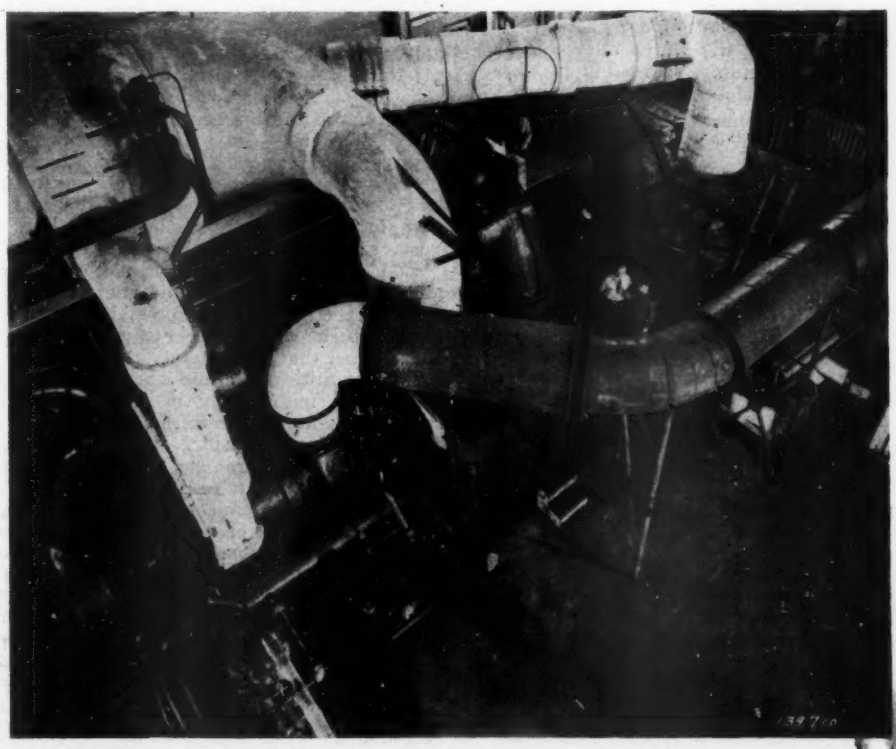
FOREIGN—European production to remain low for extended period. . . . Equipment shortages and political barriers impede restoration of fields and refineries. . . . Foreign refineries operating at capacity levels—unable to fill motor-fuel requirements. . . . Gasoline and intermediate products must be exported from United States for several years. . . . Additions to foreign refining capacity delayed by political unrest. . . . ¶Colombia modifies previous stand, permits oil companies free use of proceeds from petroleum exports. . . . Change enhances ability of operators to purchase equipment and supplies in world markets. . . .

DEMAND—Upward revision of March crude-oil demand embarrassing to state regulatory bodies. . . . Large producing states of Texas, Oklahoma, Kansas and Louisiana set March allowables on basis of original Bureau of Mines estimates. . . . Some dissatisfied operators now urging state adjustments to reflect bureau's revised data. . . . State officials generally intend to stand on previously issued orders this month. . . .

SUPPLIES—First reduction in gasoline stocks in 19 weeks gives some encouragement. . . . ¶Stocks and current production of fuel oil meeting most urgent demands. . . . ¶Navy seeking more fuel oil. . . . Wants 270,000 bbl. of Navy special and 89,000 bbl. of diesel fuel per day in next 3 months. . . . Means increase of 67,000 and 16,000 bbl., respectively, over January procurements. . . . Thirty-two refiners conferred March 8 with Secretary Forrestal. . . .

EXPLORATION—Drill-stem test on Florida wildcat disappointing. . . . Operation shutdown after failing to show oil from section previously indicating oil in cores. . . .

LABOR—Only five refineries and two pipe lines remain under Navy jurisdiction. . . . Five properties released last week. . . . Unsettled disputes involve comparatively minor points. . . .



A single engine of 3,500 hp. is not a rarity, but this one, operating at 1,500° F. in the power-producing gases, is the first ever operated to generate continuous power at such high temperatures. Allis-Chalmers designed this turbine for the Naval Engineering Experiment Station, Annapolis. The unit is really a pair of turbines; one drives the air compressor needed for the combustion cycle, the other generates the primary power to drive the machine, dynamometer, or other shaft-driven equipment. Air is used at the rate of 40,000 cu. ft. per minute. Many problems of cooling have been solved already in this design. Metals to withstand these temperatures is one of the big problems; ordinary carbon steel melts at about 2,600° F., stainless steel at 2,600°-2,700° F.

Change in State Allowables Is Doubted Despite B. of M.'s Figures

INDICATIONS early this week were that the regulatory bodies of four states may stand pat on their original March allowable orders, despite the action of the Bureau of Mines in issuing an unexpected upward revision of its own forecast. Members of the Texas Railroad Commission were reported as saying no change will be made, if at all, until the hearing March 15 at which April demand will be set.

The new bureau recommendations provided more ammunition to critics of the action of the state regulatory bodies in cutting March production. The new forecast for Texas was 1,910,000 bbl. daily—120,000 bbl. more than the bureau's original estimate.

The Texas Railroad Commission was the bellwether in the reduction action. Two weeks ago, over protests of purchasers, it slashed the state's daily allowed March production 355,000 bbl. to a total of 1,885,845, which with the estimated 5 per cent underproduction was only 1,553 bbl. over the original bureau forecast.

The Oklahoma Corporation Commission, already faced with a court test of its 30,000-bbl. cut in March allowable made on the basis of the original demand forecast of a 360,000, was handed a new bureau recommendation of 366,000 bbl. daily.

In Kansas, the March allowable of the Corporation Commission is 2,000 bbl. daily below the bureau's revised figures. March allowable in Kansas was set at 250,000 bbl. daily—a 5,000-bbl. reduction from February. Louisiana had cut of 6,000 bbl. daily. The new bureau forecast for the state was 372,000 bbl., close to the production of 371,650 bbl. reported for the week ending March 2.

Commission's Order Challenged

In a notice of appeal to the Oklahoma Supreme Court, Peppers Refining Co. challenged the Corporation Commission's order and asked that the court determine if market demand for Oklahoma shall be determined "in Washington where none of the interested parties have an opportunity to be heard, or whether it shall be determined by judicial processes within the state of Oklahoma."

The bureau's revision of its recommendations raised other questions as to the propriety of the system of basing allowed production on the bureau's forecasts. One suggestion that has been made is that the Interstate Oil Compact Commission set up its own special agency for determining petroleum market demand.

New Mexico this week set its state allocation for March at 106,000 bbl. The bureau recommended 98,000 bbl. for March for this state. New Mexico's production for the week ending March 2 was 98,450 bbl.

Whether the Texas Railroad Commission will reconsider its order is expected to be known next week when the group reconvenes. Texas' production for the week ending March 2 was reported at 2,109,250 bbl.—some 219,000 bbl. over the bureau's February recommendation. Even if the commission restores the additional 120,000 bbl. recommended by the bureau, the state will still be held considerably below its February output.

The bureau said its revisions were caused by "new data" and "factors determining the combined trend." For the entire United States it placed daily demand at 4,450,000 bbl., 20,000 bbl. above its February figure. Total United States production in the week ending March 2 stood at 4,709,470 bbl. In California, production was 847,550 bbl. with a bureau recommendation of 838,000 bbl.

In its original reduction order, the Texas Railroad Commission said the cut would allow a return to conservation practices abandoned during the war, and at the same time pointed to the heavy stocks of crude and gasoline. These stocks, 226,699,000 bbl. and 104,709,000 bbl. respectively as of February 23, are viewed by many observers as a potential threat to the oil price structure.

American Crude Production to Remain Low for Considerable Period

DETROIT.—Confused political conditions coupled with a scarcity of specialized oil field maintenance equipment and curtailed drilling operations in Germany, Austria, Hungary, and Romania will result in relatively low output from these countries for some time to come, according to Maj. L. J. Grunder, of Army-Navy petroleum board's technical division, in an address here March 4 before the Society of Automotive Engineers.

However, crude now available in these four countries is adequate to cover peacetime demands here and supply in addition Czechoslovakia, Yugoslavia, Greece, and Italy, Grunder said. Explaining that refining processes are antiquated and not suited to peacetime markets for higher grade fuels and lubricants the speaker stated that today larger than adequate quantities of crude are being processed inefficiently in order to secure the volume of refined products needed. He then said:

"Conversion of natural gas by dehydrogenation and establishment of a synthetic organic chemical products industry have not yet been exploited. Potentially, this is a source of chemical products necessary both in peace and war. The large gas reserves of Europe eventually will be harnessed for this purpose.

"Shale oil investigations were proceeding to a point well beyond the antiquated prewar methods of retorting and its position relative to other processes in terms of final use of products was under scrutiny. Since coal of several types exists in large quantities in Germany, Poland and Czechoslovakia it was only natural that synthetic processes were developed in Germany prior to the time crude oil was discovered. It was their only hope for continuing war after external sources were denied them.

"World War 2 pointed out clearly the military importance of hydrocarbons in their many forms. It also focused attention upon success in scientific progress on both sides. Most clearly did it point out the advantages to nationals recognizing the need for basic scientific training of many men during periods of peace.

"The contributions made by technicians in the service and industry in the United States cannot be minimized. Technical men should expand their minds now to accommodate unusual processes and techniques now being published and made available as the result of painstaking investigations by allied technical groups which have been searching through the documents and in minds of those who worked against us to reevaluate our progress with a more realistic measuring stick."

Ironically enough, Grunder pointed out, American oil interests made extensive geophysical exploration in these satellite countries, and during the 5-year war period crude oil was found exactly where American interests predicted.

Midwest Markets Steadier, While Gulf and East Coast Prices Soften

by Dahl M. Duff

MIDDLE West markets both in gasoline and natural gasoline appeared steadier this week, although a weakening in quotations was noted on the East and West coasts. Higher gasoline demand, coupled with a drop in production and in stocks, gave an encouraging tone to the national picture.

In natural gasoline, one marketer expressed the opinion that the price had reached bottom. Quotation for 26-70 grade was 2¾ cents in the Oklahoma (Group 3) area, and 2¼ in North Texas. The market had fallen from 4 cents in Oklahoma and 3¼ in North Texas on Jenuary 26.

The low in Mid-Continent area housebrand gasoline ranged from 5 to 5¼ cents. While spot market gasoline was still being offered as much as ½ to ¾ cent below these quotations, the quantity of this so-called distress motor fuel was reported to be not as great as a few weeks ago. Some of the gasoline from cycling plants which has been considered as depressing the market, is now entering crude lines to refineries, it was said.

At 104,709,000 bbl. natural gasoline stocks were still more than 8,737,000 bbl. above the total for the corresponding week last year, but it represented the first decline in the stock figure in 19 weeks.

Several other indications in the production demand, and stock statistics for the week ending February 23 gave rise to hope that the general trends will be brought into better balance. Gasoline production, at 13,175,000 bbl., was down 827,000 bbl. from the preceding week's output. Daily gasoline demand increased 104,000 bbl. to 1,917,000 bbl., the greatest gain since December 8. Demand for all refined products was up 6.5 per cent over the previous week.

As a result of the cutbacks in gasoline and heavy fuel oil, production of the major refined product declined approximately 5 per cent during the February 23 week. Kerosene production rose to a total of 2,437,000 bbl. for the week, a record for several years. The increase over the preceding week was 152,000 bbl.

Less favorable, however, was the situation in distillate and residual fuels. Demand for these products continued high, although it is expected to ease with the approach of spring.

Production and stocks both of fuel oils and residuals dropped in the week ending February 23. For gas oil and distillate fuel oil, production was 5,728,000 bbl. compared to 5,776,000 bbl. the previous week. Stocks of this product declined from 27,273,000 bbl. to 25,898,000 bbl. For residual fuel oil, production was 7,913,000 bbl., compared to 8,813,000 bbl. the previous week. Stocks of this product declined from 40,036,000 bbl. to 39,290,000 bbl. during the week.

Some observers find little encouraging in the long-term outlook for fuel oils. Shortages led the Office of International Trade Relations in the Department of Commerce to impose a recent 10-day ban on exports of residual and of gas oil for diesel engines. The Office of Price Administration is reported to have been told in a canvass of refiners in the East Coast and the Gulf Coast districts that residual production can be improved by the reestablishment of a modified gravity scale.

Must Replenish Navy Stocks

Another factor is that beginning April 1 the industry must start replenishing stocks of the Navy which relinquished its earmarked inventories to civilian consumers during the early winter months. From New York came reports that residual fuel oil is becoming so scarce that an allocation system may be necessary. One supplier said his company already has set up a "sort of allocation system" at the Gulf. General outlook on No. 2 fuel oil is "not nearly as bad," according to suppliers, but is still tight.

In California, markets were characterized by continued firm price and high demand for kerosene and heating oils. Gasoline quotations were unsteady with a variety of prices prevailing on the low side. Fuel oil was firm and moving in limited quantities at ceiling. Standard Oil Co. of California announced an increase in kerosene prices of ¾ cent in all points in its marketing territory except in Utah and Idaho. The raise was authorized the previous week by OPA. New posted tank-truck prices included 12¼ in San Francisco, 10¾ in Los Angeles, 14¼ in Reno and Seattle, and 17½ in Spokane.

The gasoline market on the East Coast showed some weakness during the week. Supplies were plentiful with another reduction of ½ cent in spot-market prices both on regular and premium grades reported from Baltimore. One supplier reduced tank-car postings from 7 cents to 6½ cents for regular 76-78 octane, and his premium from 8 cents to 7½ cents. The move, he said, was necessary to meet competition. Suppliers' spot-market quotations for regular remained unchanged in New York and Philadelphia at 7 cents, though reliable sources state there are offerings as low as 6 3 cents.

Independent's Position Due for Hearing

WASHINGTON. — Hearings on the position of the independent company in the petroleum industry will open March 19 before the Senate committee on petroleum resources, it has been announced by the chairman, Sen. Joseph C. O'Mahoney.

The hearings will continue for about 4 days and will be the last in the series which the committee has been holding since summer.

O'Mahoney said the hearings will cover such subjects as whether the position of the independent has been improved or injured as a result of the war; the outlook for competition in production, refining, and marketing; relationship of the independent integrated companies; effect of withdrawal of war controls; and government policy toward the independent.

A detailed presentation has been prepared by a special industry committee, as follows:

Opening statement: B. A. Hardey, president, Independent Petroleum Association of America, and chairman of the committee, on the independent company.

History and character of the independent oil producer: Russell B. Brown, general counsel, I.P.A.A., Washington.

The production of oil and gas: O. C. Bailey, Bailey & Trimble, El Dorado, Ark.

(a) Second recovery: D. T. Andrus, immediate past president, Pennsylvania Grade Crude Oil Association, Bradford.

(b) The conservation of stripper wells: H. M. McClure, president, National Stripper Well Association, Alma, Mich.

Taxes: Charles R. Bell, controller, Kerr-McGee Oil Industries, Inc., Oklahoma City.

Costs and price of oil: Merle Becker vice president, W. C. McBride, Inc., St. Louis.

Imports: Wirt Franklin, past president, I.P.A.A., Ardmore, Okla.

The independent company in the refining of oil: Fayette B. Dow, National Petroleum Association, Western Petroleum Refiners Association, Washington.

Summary: H. B. Fell, executive vice president, I.P.A.A., Ardmore.

Ten-Year Forecast of World Oil Picture Is Optimistic

CHICAGO. — The expected temporary severe decline in the level of petroleum industry operations with the end of the war did not occur, and Howard W. Page, economics department, Standard Oil Co. (N.J.), and former director of the program planning division, Petroleum Administration for War, analyzed the causes, the trends now at work, and made a tentative generalized forecast of the probable world-wide future during the next 10 years. He spoke here last week at the annual meeting, American Institute of Mining and Metallurgical Engineers.

In discussing the situation, Page said that it is interesting to take inventory of the near-term situation, see what significant forces are at work, and using this as a starting point, to engage in something more satisfactory than pure speculation concerning trends 10 to 20 years in the future.

Foreign crude oil production and refinery operations have actually increased since V-J day, are running at capacity, and still the supply falls somewhat short of requirements. For the remainder of 1946 he anticipates foreign operations will remain at maximum capacity. Meantime domestic activities have fallen off about 10 per cent from the peak of July 1945, less than was generally anticipated, and for the remainder of 1946 the anticipated decline is perhaps another 5 per cent.

Basic Reasons for Changes

The basic reasons for these changes, according to Page, are that the bulk of the military reductions were in gasoline, where increased civilian consumption was small compared to the cut in military demands. In gasoline, the entire net effect of lowered demands is felt by the United States, because foreign gasoline consumers usually secure their supplies from foreign sources first, acquiring only their marginal requirements from the U. S.

Two important reasons dictate this choice: (1) Lower requirements for dollar expenditures are more important in most foreign countries today than the cost of gasoline in local currency; (2) Decreases in gasoline production at foreign refineries would cause disproportionate losses in fuel-oil production, leading to a world-wide shortage of this product.

Foreign refiners, at capacity, cannot produce quite enough gasoline, kerosene, distillates, and lube oils for foreign consumption, but do produce an excess of residual fuel oil. U. S. refiners, on the other hand, cannot produce enough residual fuel oil to meet this country's requirements. The probable net effect is to leave the U. S. in the position of exporting the rest of the world's marginal requirements of gasoline and other overhead products for some years, and to import from foreign refiners, their excess production of residual fuel oil.

Over the next 10 years, it appears likely that the Eastern Hemisphere demands (excluding Russia), will increase about 675,000 bbl. per day, while Western Hemisphere demands outside the United States will increase about 160,000 bbl. daily. Domestic requirements in the U. S. are estimated to increase about 2 per cent per annum.

In that period, foreign crude production and refining are expected to continue at maximum capacity, with foreign refining capacity increasing as new equipment becomes available. Despite this increased refining capacity it is anticipated that exports of overhead products from the U. S. some 10 years hence will still be in the neighborhood of 200,000 bbl. daily.

At the same time, the trend of changes in U. S. refining methods is all toward a steady lowering of the yield of residual fuel oil. This reduction in domestic fuel-oil production will expand imports of that product.

These basic trends seem to point toward a situation over the next 10 years that will leave the balance about as at present, even though considerable increases in volume of foreign production and refining will have taken place.

TRENDS IN RELATIVE FUTURE DOMESTIC AND FOREIGN PETROLEUM OPERATIONS
(Analysis by Howard W. Page)

ESTIMATED REQUIREMENTS
(Thousands barrels daily)

	Year 1946			Year 1956		
	Domestic	Export	Total	Domestic*	Export	Total
Gasoline	1,765	160	1,925	2,400	100	2,500
Kerosene	206	38	244	220	30	250
Distillates	543	118	661	800	50	850
Residual	1,196	37	1,233	1,200	..	1,200
Other products and losses	624	37	661	650	10	660
Total products	4,334	390	4,724	5,270	190	5,460
Crude oil	37	89	127	40	50	90
Total crude and products	4,372	479	4,851	5,310	240	5,550
Stock increase	....	....	61	....	..	....
Total	....	....	4,912	....	..	5,550

*The estimated increase in domestic requirements is approximately 2 per cent per year of the 1946 volume.

ESTIMATED REFINERY OPERATIONS
(Thousands barrels daily)

			Year 1946	Year 1956
Crude runs to stills			4,252	4,360
Product Yields—	M B/D	Per cent	M B/D	Per cent
Gasoline	1,666	39.2	2,000	45.8
Kerosene	251	5.9	250	5.8
Distillates	665	15.6	850	19.5
Residual	1,061	25.0	700	16.0
Other products and losses	609	14.3	560	12.9
	4,252	100.0	4,360	100.0
Total supply—			1946	1956
Domestic crude production			4,221	†4,200
Domestic natural gasoline, condensates, etc.			310	400
Hydrocarbon synthesis (gas to gasoline)				200
Crude imports			240	300
Residual imports			130	450
Miscellaneous imports			11	....
Total			4,912	5,550

†Estimate (MER).

Hand Becomes Officer of Ralph M. Parsons Co.

WASHINGTON. — Allan H. Hand, formerly secretary of the Petroleum Industry War Council, has become vice president of the Ralph M. Parsons Co., Los Angeles. The company is engaged in economic and engineering studies and design and construction of refineries and petroleum properties.

INTERNATIONAL

Creole's Production Dips Slightly in January

Daily average crude production during January, for Creole Petroleum Corp. in Venezuela, was 512,873 bbl., compared with 523,689 bbl. for December. Daily crude production in January 1945 was 390,245 bbl.

Total crude refined in January was 69,028 bbl. daily, compared with 81,872 bbl. daily in December. This crude was refined at Caripito and La Salina, with January throughputs running at 38,691 bbl. daily at Caripito and 30,337 bbl. daily at La Salina. This compares with December's throughput of 50,020 bbl. daily at Caripito and 31,852 bbl. at La Salina.

In January 361,299 bbl. were taken daily from the Lake Maracaibo area and 151,574 bbl. from eastern and other areas (including Cumarebo). This compares with December's daily production from the Lake Maracaibo area of 366,642 bbl., and from eastern and other areas (including Cumarebo) of 157,047 bbl. In January 1945, 288,693 bbl. daily was produced from Lake Maracaibo area with 101,522 bbl. daily from eastern and other areas.

A total of 18 oil wells were completed in January by Creole, with no gas wells and only 1 dry hole. In December, 15 oil wells were completed, no gas wells and 3 dry holes. The number of oil wells completed in January and the fields follow: Bolivar Coastal (B.C.F.), five; Mulata, three; Jusepin, nine, and San Joaquin, one. The one dry hole was also in San Joaquin.

Average initial production in January was highest in B.C.F. with 634, and Jusepin next with 372. In Mulata the average initial production was 366 bbl. and the one oil well in San Joaquin flowed at 137 bbl.

The average well depth in the four fields with January completions was: B.C.F., 5,221 ft.; Mulata, 5,377 ft.; Jusepin, 5,085 ft., and San Joaquin, 7,240 ft.

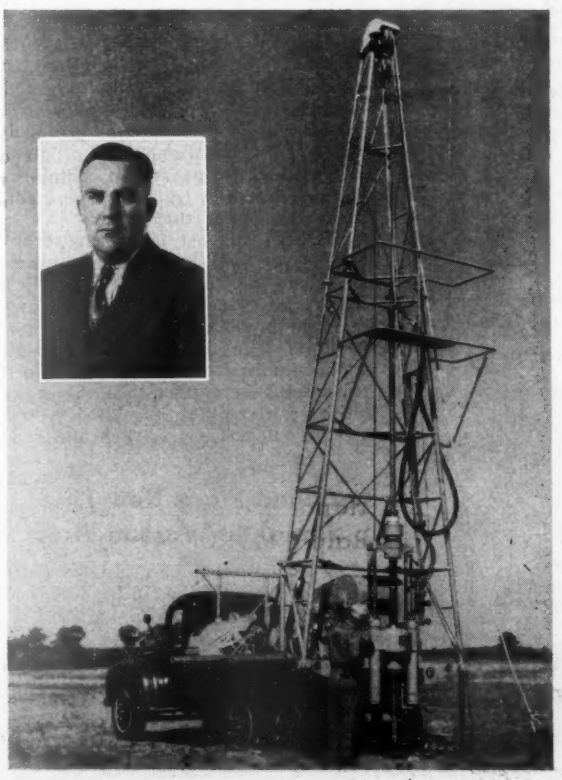
Production Gradually Gaining in France

PARIS.—French industry is moving steadily ahead with reconstruction of the war-ravaged Pechelbronn field in Alsace, the most important petroleum deposits thus far discovered in metropolitan France.

Societe Anonyme d'Exploration Miniere Pechelbronn, which in 1939 processed 500,000 bbl. of crude from the field, plus about 35,000 bbl. of imported oil, regained possession of its properties in March 1935. Production, gradually climbing back toward prewar levels, amounted to 925 bbl. in September 1945. Of 857 pumping installations working in 1944, 616 were functioning in November 1945.

Exploited since 1735, Pechelbronn consists of a group of small fields scattered from Soulz-sous-Forets to Monnenheim. Total production since the beginning of exploitation has amounted to more than 18,500,000 bbl., with about 5,300,000 bbl. coming from shafts and galleries driven into the oil sand. Wells drilled number about 5,000, totaling 1,900,000 m. (6,233,000 ft.)

Last December shipments totaled approximately 4,250 bbl. of gasoline, 60 tons of "white spirit," 3,488 bbl. of kerosene, 9,425 bbl. of gas oil, 1,075 tons of light and heavy oils, and 580 tons of pitch.



This is the first of 11 drilling units purchased by the Turkish Government from the Geo. E. Failing Supply Co., Enid, Okla., for delivery in 1946 in an expansion of exploratory operations. H. V. Hueppelsheuser, inset, a long-time employe of the Failing company, has arrived in Turkey to supervise the program and to train crews in operation of the equipment

Tardy Concession Action Slows Colombian Drilling

BOGOTA.—Although Tropical Oil Co. here reportedly had to lay off about 250 men, due to its inability to obtain concessions in the Llanos region of Colombia, it was believed that this would be only temporary in that the oil unions have referred the matter to the Ministry of Labor, where action is expected shortly to put the men back on the payroll. Tropical and other affiliates have field concession bids covering some 5,000,000 acres in the Llanos region, about 700 miles from the Caribbean tidewater, but has been unable to obtain a firm concession, so far, in this prospective oil region.

Plans call for moving a 12,000-ft. drilling unit into the Llanos region when and if—and prospects reportedly are good—the government grants the necessary rights. Tropical plans to move part or all of the drilling equipment from Barranquilla to the Llanos in boxcar freight planes, carrying some 10 tons on each 2½-hour trip.

Atlantic Refining Reported Deepening Haiti Test Well

PORT AU PRINCE, Haiti.—Atlantic Refining Co. is reported to have moved in a rotary rig to go deeper in its test well near here.

The well was last reported at about 8,000 ft. The first well ever drilled in this republic was a small noncommercial gasser which reached its producing sand near 9,000 ft. Drilling operations have been slowed by lack of equipment, hard structures and unfamiliarity of native labor with the work.

Another Ecuador Wildcat

NEW YORK.—After abandoning the first wildcat in the northeast section of Ecuador, in Buano, the Shell Co. of Ecuador is now preparing to drill a second well. The first was drilled to approximately 5,000 ft.

Bolivia Awards Contract for 255-Mile, 6,000-Bbl. Pipe Line

by Warren W. Burns

NEW YORK.—A contract to design and construct a 255-mile 6-in. pipe line for Yacimientos Petroliferos Fiscales Bolivianos (Bolivian Government Oil Fields) has been awarded to Williams Brothers Corp., engineers and contractors. Details of the contract are being handled by Williams Brothers' foreign department here.

The pipe-line system will handle crude produced in the Camiri oil field area, delivering it to a location near Tintin. Initial capacity of this line will be 6,000 bbl. daily at 1,500 lb. pressure and will require three pumping stations.

Each pumping station will include two diesel-engine-driven reciprocating pumping units together with necessary auxiliaries, living quarters, and recreational facilities for station personnel. The system will also include a storage and railroad loading terminal at Tintin and several auxiliary highways.

Cost of the project, to be met from Bolivian funds, is between $7,000,000 and $10,000,000. The Export-Import Bank, which gave financial assistance to Bolivia for drilling and exploration, was reportedly not willing to make a loan for the pipe-line project.

Reports from New York are that refinery-location plans are not yet settled. However, Foster-Wheeler Corp. may build two package refinery units each of 1,000-bbl. capacity at Tintin. A fixed refinery at Cochabamba, about 110 miles north of Tintin, also is reported under consideration. Crude would be moved in tank car from Tintin if the Cochabamba plant is built.

Due to the ruggedness of the terrain and the high altitudes, many unusual design and construction problems are involved. Elevations range from about 2,000 ft. at the Camiri fields to more than 10,000 ft. at points on the line. Use of the heaviest type of construction equipment will be required. Williams Brothers is planning to send another survey party to Bolivia before April 1.

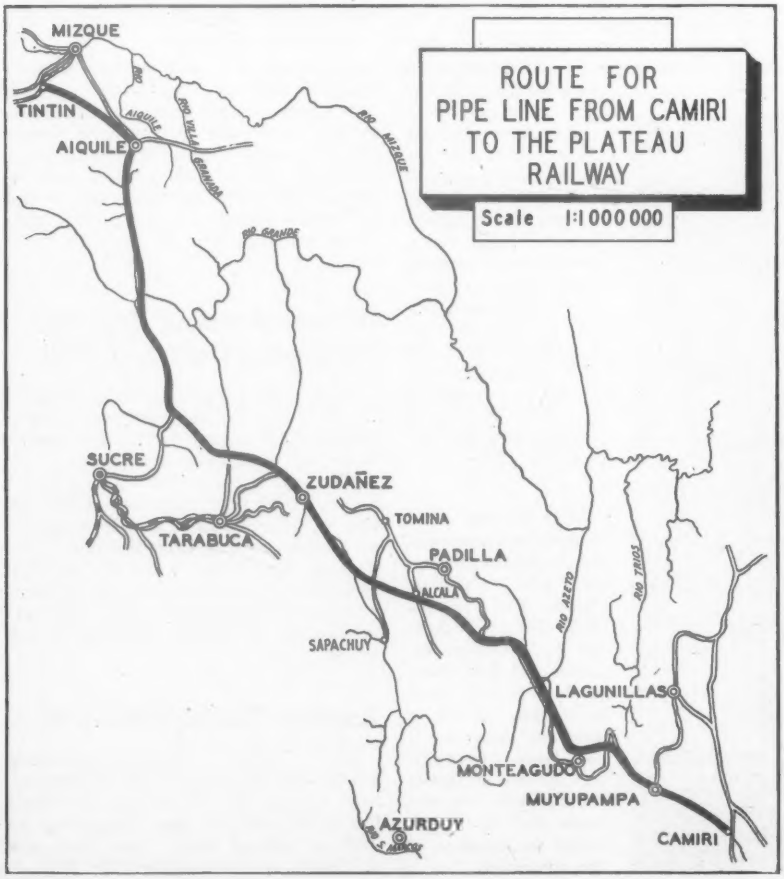
Outside diameter of the line will be 6⅝ in. By increasing pumping capacity of the three stations and constructing an additional station, capacity of the line can later be raised from 6,000 to 12,000 bbl. daily. The Williams firm hopes to start work not later than April 30 with completion by February of next year. The construction schedule will be partly dependent on the availability of American-made materials.

The construction company is now shipping 25 bulldozers, 40 trucks, 3 road patrols, 15 welding machines, boom tractors, tow tractors, trailers, rooters, air compressors, pile drivers, carry-alls, as well as camp equipment to accommodate foreign personnel totaling 75 persons. Pipe will be shipped in 12-ft. lengths from New York. All material will go to the port at Antofagasta in Chile and will be sent by rail to Tintin by way of Oruro and Cochabamba.

Bolivia's entire oil industry was nationalized in 1937 and is administered by Y.P.F.B. Production is highest in the Camiri field with daily oil production upwards of 500 bbl. daily. This field reportedly has reserves of about 21,000,000 bbl. and produces 50° (A.P.I.) gravity crude at depths of around 3,280 ft.

Currently, Y.P.F.B. is operating refineries at Camiri and Sanandita with both having a daily throughput of around 700 bbl. All light products from Sanandita are sold in the local market, and most of the fuel oil is exported to Argentina. All products from Camiri are packed in containers and distributed in trucks to Sucre and Santa Cruz over dirt roads.

Y.P.F.B.'s biggest marketing problem lies in lack of adequate transportation facilities. The Republic's two refineries are situated in the lowlands in the south, and the principal market lies in the larger cities high in the Andean ranges. Products are transported in drums to local areas within a radius of 400 to 500 km. (around 310 miles) by truck and rail.



Stanolind Plans New Line In Slaughter-Wasson Area

The Stanolind Pipe Line Co. will construct 35 miles of 16-in. line between its Wasson and Slaughter stations in West Texas to provide its own facilities for the movement of crude gathered in the Wasson field.

The order for the pipe has been placed, and it is planned to start the construction work as soon as the pipe is delivered some time in May.

John S. Bell, Humble Oil & Refining Co., chairman, standing committee on production engineering; H. F. Beardmore, Barnsdall Oil Co., chairman, petroleum division; C. R. Hocott, Humble, associate chairman, and M. L. Haider, Standard Oil Co. (N. J.), retiring chairman

Petroleum Division, A.I.M.E., Is Planning Increased Activity in 1946; Local Chapters Stressed

by Charles J. Deegan

CHICAGO. — With relations at the top with the parent organization largely ironed out, the new officers of the petroleum division of the American Institute of Mining & Metallurgical Engineers, and the section delegates to the convention here last week were in agreement that attention and activity during 1946 should be focused on the local chapters, and the individual members.

Every effort will be made to build up the local interest and activity of individual members in their chapters, in the belief that only by strengthening the organization at the bottom and widening the interest of the individual members, can the ambitious plans of the division as a whole be realized. Announcement of the employment of the new secretary with Dallas headquarters is expected soon, and this new officer will serve as a clearing house for exchange of ideas among local chapters, and to assist the officers in knitting the organization together more tightly than ever before.

The close correlation of the technical and economic phases of petroleum-engineering problems was clearly illustrated in the balance of the subjects of the papers at this year's annual meeting. In the paper, "Gravel

Right: Dr. E. A. Stephenson, University of Kansas, and L. A. Ogden, Pure Oil Co.

Below, left: Dr. H. H. Power, University of Texas, and Dr. Santiago E. Vera I., University of Caracas (Venezuela)

Below, right: Thomas Barger, geologist, and J. Terry Duce, vice president, Arabian-American Oil Co.

Packing of Oil Wells," by Thomas S. West, Alamo Oil Co., and Al Buchanan interests, San Antonio, an important contribution was offered to solve the problems of economic recovery of oil reserves from thin oil column sands, particularly those with a high gas-oil or oil-water ratio.

He suggested that water-coning was not the immediate cause of the difficulties with such wells, but more likely the result of (1) erosion of the formation, (2) flowing out of mud filter cake, or (3) failure of the cement. An open-hole gravel-pack type of completion procedure is proposed to prevent failures of this type by preventing movement of all solid material in the space in which completion is made.

By using various combinations of layers of gravel, sand, and cement, this objective can be achieved. The use of fluids having fine solids in suspension and contained in the pores of a coarse gravel layer is sometimes used for sealing, by forming an impermeable filter cake on an adjacent sand layer. A plug which tends to be automatically self-sealing is thereby secured, whereas leakage past plugs of cementing materials tends to become progressively greater.

Causes of Corrosion

Light was thrown on the causes of corrosion in water disposal, water treating, and water-input systems in East Texas by F. B. Plummer and I. W. Walling, of University of Texas. Their research showed that bacteria played an important part, particularly those bacteria in oil field waters that have the ability to produce hydrogen sulfide from harmless sulfate salts in the water.

Recently it has been demonstrated that the black deposits in the bottom of oil tanks, in waste pits, and in pipe lines, which cause erosion of tanks and clogging of filters are due to these same bacteria. If the bacteria are killed no hydrogen sulfide and no black precipitates occur. If the bacteria are given an environment encouraging growth, the obnoxious odors, harmful precipitates, and excessive corrosion of pipes and tanks increase enormously.

Investigations revealed that the bacteria grow best at about 120° F., develop very little below 60° F., or above 140° F. They are not killed by addition of chlorine or alcohol (both usually considered good bactericides). They are killed by boiling water, formaldehyde, phenol, trichlorobutane, creosote, and most good bactericides. Growth is accelerated by the presence of metals, such as iron, magnesium, or aluminum, and by the presence of iron sulfide or rust. They are greatly inhibited, if not killed, by the presence of much oxygen, iron oxide, sulfur, sulfo-cyanides, and rubber impregnated with sulfur. Killing off or retardation of the growth of these bacteria will eliminate objectionable odors, rusting, and obnoxious black sludge in oil tanks.

A different approach to the problem of estimating the cost of replacing petroleum reserves was urged by James V. Brown, of Independent Petroleum Association of America, in his talk on "The Trends in Costs of Replacing Petroleum Reserves." Pointing out the fallacies in considering this problem by the conventional accounting systems prevalent in the industry, he stated that the computation of current replacement cost must be based on consideration of total cash expenditures or costs incurred, rather than bookkeeping charges. The total of all bookkeeping costs divided by the volume of net production represents bookkeeping costs per barrel. Comparison of such costs with corresponding replacement cost figures shows that the bookkeeping figures are utterly unrealistic when considered in relation to the actual changes in operating conditions. Therefore the bookkeeping profit must be at least equally unrealistic.

Cost finding, according to Brown, must take into consideration values as well as costs. Continued government control on prices makes it necessary that replacement costs be recognized in establishing a fair and equitable price. The engineers and economists, working together with the accountants, can and will find the answer to management's question—What is it costing us to find, develop, and produce crude petroleum?

In discussing "Correlation of Drilling With Production Requirements," Brad Mills, executive secretary, American Association of Oilwell Drilling Contractors, reported that it is clearly impossible to develop a fixed formula that will show from year to year the number of oil wells needed to maintain a proper balance between supply and demand, but that it is possible to chart a general course, after careful consideration of all factors, and that over a 10-year period at least a rough balance between drilling and producing operations is automatically maintained.

The number of wells required each year depends largely on the type of development predominating. Where two or more large, undeveloped fields are in line for intensive activity, fewer wells are required to meet day-to-day oil needs than if random drilling is predominant. The nature of one year's wildcat discoveries affects drilling during the next year, or years. The discovery of five or six large fields in a single year might reduce the number of wildcats needed from 4,000 during the discovery year to 2,000 during each of the next 2 years.

Over-all drilling efficiency is difficult to calculate, but it plays a definite part in any yearly development program. In 1941 the maximum number of rotary rigs in operation at any time was 1,275, but about 31,200 wells were completed. In 1944 the number of rigs averaged about 1,525, but only 24,000 wells were completed. Obviously drilling operations are affected sharply by the efficiency of the over-all effort, as well as by depth and other factors, of which the most important probably is time. The return of veteran drilling crews, easier acquisition of needed equipment, and restoration of normal transportation facilities will do much to raise operating standards.

Benefits of Good Program

The nearest possible approach to continuity of operations is needed during future years. Oil companies generally appreciate the benefits derived from a well-planned development program and have pledged cooperation with contractors. The need for fairly continuous drilling operations is genuine where a definite job is to be done. New locations should be made far enough ahead of completions to prevent a lull between wells, enabling the contractor to retain his crews from well to well and generally do a workmanlike job at a reasonable rate.

Taking the broadest possible view of the whole economy, Dr. John D. Gill and B. A. Stainton, of Atlantic Refining Co., discussed "Productivity, Prices and a Sound Wage Level" from a national standpoint. As a result of exhaustive research, Dr. Gill was able to announce for the first time that the long-term trend of wholesale commodity prices was sidewise, with neither an upward nor downward trend, except during temporary cycles.

The authors found that the long-term trend of the cost of living was slightly upward, and the per capita real national income, the measure of true productivity was increasing steadily and at an accelerating rate. The seeming contradiction between the cost of living trend and the trend of wholesale commodity prices, was explained as resulting from inability of labor in service and distributive industries to materially increase their productivity in the same manner as factory workers. Therefore prices of services go up with increased wage costs, resulting in a rising cost of living, even though commodity prices do not increase.

According to the authors, sound prosperity requires an equilibrium to be maintained between the various factors of the economy, and the safety of the investor ultimately requires that wages be increased and hours of work shortened as productivity increases. They pleaded for wage-change leaders, and working-hour-change leaders in various industries to serve the same valuable economic services that price-change leaders perform in their field.

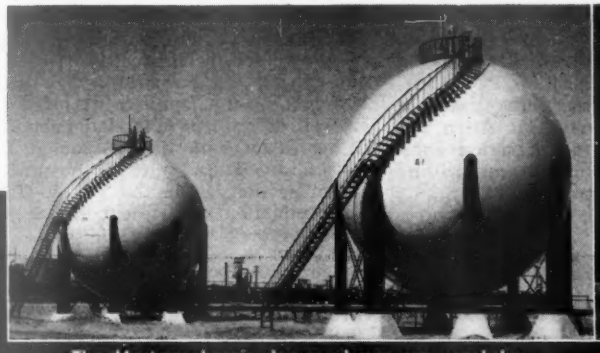
STORAGE..

the logical method of *Stopping* vapor loss

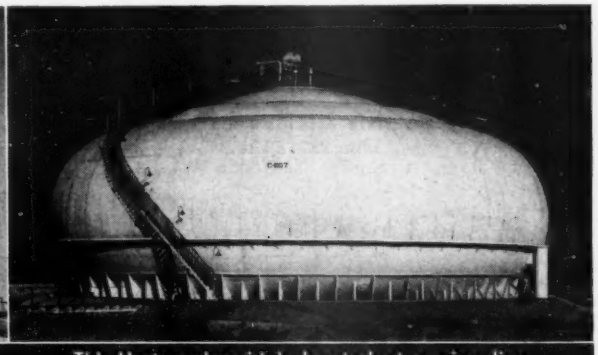
From production to marketing the petroleum industry uses these pressure storage tanks to guard volatile products from evaporation loss

HORTONSPHERES . . . Spherical storage tanks used in the handling of the more volatile grades of natural gasoline, butanes, butane-propane mixtures, butadiene and volatile refinery charging stocks. Hortonspheres can prevent all breathing losses, and boiling losses if the correct working pressure has been chosen and the sphere designed to operate at that pressure. Hortonspheres also reduce filling losses on a wide range of products. They are built in standard capacities from 1,000 to 25,000 bbls. for liquids and from 20 to 65 ft. in diam. for gases . . . and for pressures up to 40 lbs. per sq. in. in the largest sizes and higher pressures in the smaller sizes. *Write our nearest office for Bulletin F which describes the Hortonsphere in detail.*

HORTONSPHEROIDS . . . Spheroidal-shaped storage tanks used to store hydrocarbons ranging in volatility from motor gasoline to natural gasoline. Hortonspheroids minimize evaporation losses by making use of the simple fact that no loss can occur unless vapor escapes from the vessel. They are effective in reducing filling, boiling and breathing losses. Smooth type Hortonspheroids are built in capacities of 2,500 to 40,000 bbls. for pressures from 2½ to 35 lbs. per sq. in. and in noded designs from 20,000 to 120,000 bbls. for 2½ to 20 lbs. per sq. in. *Write our nearest office for Bulletin E which describes the Hortonspheroid in detail.*



The Hortonspheres shown above are used by an oil company in Oklahoma to store butane at 85 lbs. per sq. in. pressure. They hold 5,000 bbls. each and are 38 ft. in diameter.



This Hortonspheroid is located at a pipe line terminal. It has a capacity of 80,000 bbls. and is used to store natural gasoline at 10 lbs. per sq. in. working pressure.

BRIDGE & IRON COMPANY

Chicago, 4 . . . . . **2128 McCormick Building**
New York, 6 . . . . . **3347-165 Broadway Building**
Cleveland, 15 . . . . . **2204 Guildhall Building**
Los Angeles, 14 . . . . . **1423 Wm. Fox Building**
Atlanta, 3 . . . . . **2154 Healey Building**
Birmingham, 1 . . . . . **1536 North 50th Street**
Plants at BIRMINGHAM, CHICAGO and GREENVILLE, PENNA.

Tulsa, 3 . . . . . **1606 Hunt Building**
Houston, 1 . . . . . **5619 Clinton Drive**
Philadelphia, 3 . . . . . **1615-1700 Walnut Street Building**
Washington, 4 . . . . . **703 Atlantic Building**
San Francisco, 11 . . . . . **1254-22 Battery Street Building**
Detroit, 26 . . . . . **1514 Lafayette Building**
In Canada: HORTON STEEL WORKS, Limited, FORT ERIE, ONT.

Pauley Hearings Will Be Resumed

WASHINGTON.—Hearings on the nomination of Edwin W. Pauley for Undersecretary of the Navy will be resumed this week when the nominee is scheduled to present his witnesses in an attempt to refute opposition testimony concerning his oil connections alleging that he is unfit to hold high public office.

The hearings held before the Senate Military Affairs Committee have resulted in a barrage of recriminations against Pauley and his supporters. Harold L. Ickes resigned as Secretary of the Interior in protest to the nomination, but President Truman has remained staunch in his support.

In an informal press conference late last week, Pauley told reporters that he still expects to be completely vindicated and that he will fight for confirmation for the Navy job "if it takes until summer."

Administration pressure is being applied to democratic senators in an effort to muster as much strength as possible. In spite of conferences with Postmaster General and Democratic National Chairman Bob Hannegan, Attorney General Tom C. Clark, and Democratic National Committee Publicity Director Sam O'Neal, administration leaders in the upper house privately admit that they do not have the votes to secure confirmation for Pauley.

During the hearings last week Pauley and Standard Oil Co. of California both were charged with having been fined by the State of California "for stealing oil." The charge was made by John A. Smith, California oil man. Smith's testimony before the committee had been under continuous attack by Senator Tydings of Maryland.

Apparently losing his temper after several hours on the witness stand, Smith broke into the line of questioning and pulled a table microphone closer to his mouth.

"As to the credibility of witnesses," he said, "the Standard Oil and Mr. Pauley both have paid fines to the State of California for stealing oil."

Pauley immediately jumped to his feet and shouted:

"That's a dirty lie."

Previously, Smith had testified that he had been warned by Norman Littell, a former assistant attorney general, that the committee would attempt to "smear" him when he appeared. Littell, he said, had told him a few days before that the "smear" would involve "some situation in California in which you were accused of stealing oil."

"I said that was all right," Smith told the committee. "I'd be glad to tell the committee about that."

Tydings' line of questioning had been an attempt to prove that Smith was "trying to conceal" this part of his conversation with Littell.

Senator Tobey of New Hampshire, leader of the opposition to the Pauley appointment, explained to the committee that he had requested Littell to aid him because of his "limited ability and lack of legal training."

Osborn Takes Charge of Continental Refineries

PONCA CITY.—Harold G. Osborn will assume full charge of the eight refineries of Continental Oil Co. with the retirement of Dr. Walter Miller as vice president of the company.

Osborn joined Continental in 1921 and a year later was made assistant to Dr. Miller. He became assistant superintendent of the Ponca City refinery in 1926, assistant manufacturing manager in 1927, and manager in 1935.

Dr. Miller rose from a job as a blacksmith's helper to a vice presidency in the Continental organization. A native of Switzerland, he attended school in New Jersey. In 1921, his time was occupied with consulting refinery work for Marland Oil Co., and in 1922, he took full charge of Marland refining operations. When Marland merged with Continental in 1929, he continued as vice president in charge of manufacturing. Dr. Miller will continue active work in the oil industry with a consulting service.

In two other personnel shifts in Continental's organization, E. F. Battson, New York, was made assistant to the president, and C. R. Allen was promoted to become proration engineer of the production and drilling department.

Allen succeeds R. Van Mills who is retiring under the company's annuity benefit plan. The new proration engineer has been division superintendent, production department, of the Illinois-Indiana field.

Battson, who takes a post left vacant by the resignation of George D. Olds, also is assuming chairmanship of the advertising committee and of the manufacturing and sales committee. Since 1942, he has been eastern sales manager, marketing department.

DEATHS

L. V. Surtees, 52, eastern division manager of Mid-Continent Petroleum Corp., died February 26 in Terre Haute, Ind. He joined Mid-Continent in 1922 as an employe in the West Tulsa refinery.

Edward D. Pearson, general supervisor of Ethyl Corp. at Baton Rouge, died February 25 in New Orleans.

C. R. Johnson, 58, former Tulsa lease broker, died February 27 in Compton, Calif.

Edwin A. Rogers, 97, retired oil man who figured in the development of Maricopa field and who was a partner of E. L. Doheny in exploiting properties in the vicinity of Los Angeles, died February 27 in Los Angeles.

Arch L. Smith, 69, independent producer and drilling contractor, died March 1 in Tulsa. He came to Tulsa in 1907 from Bradford, Pa., and had conducted drilling operations in many sections of Oklahoma and Texas.

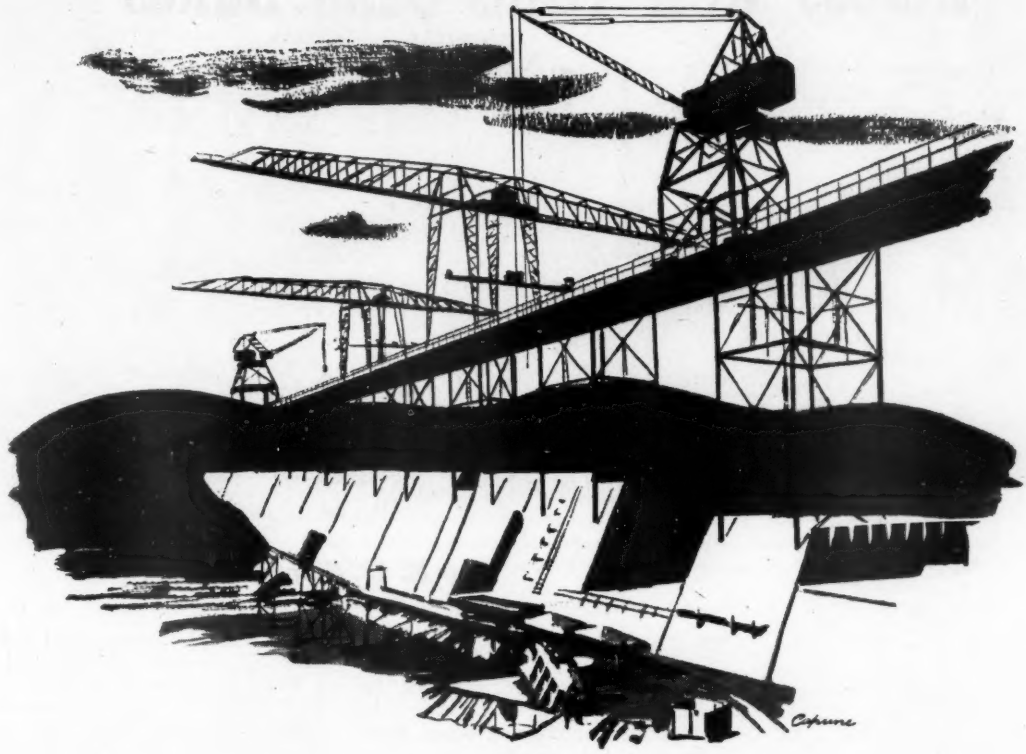
John E. Farrell, 54, who played an important part in the development in the East Texas field and who was widely known as an independent operator throughout the Southwest, died February 27 in Fort Worth. He left his home in England at the age of 17, first working as a mechanic in Canada and later moving to Fort Worth where he became a vice president of Marland Oil Co. As an independent in 1931, he and W. A. Moncrief blocked acreage for a wildcat test that proved to be the discovery well of the Gregg County portion of the East Texas field. At the time of his death, Farrell was doing business as Farrell & Co., Farrell & Co. of Louisiana, a gas company, and Farrell Drilling Co.

R. E. Nelson, 80, veteran scout and crude oil purchasing agent for the old Sinclair Crude Oil Purchasing Co., and later for its successor, Stanolind Crude Oil Purchasing Co., died March 1 at his home in Okmulgee. He retired in 1938 and had been in ill health for some time. A son, R. E. Nelson, Jr., Tulsa, chief of the unitization section, Stanolind Oil & Gas Co. production department, is one of the survivors.

George O. Baird, 72, retired oil operator who was widely known throughout the Mid-Continent area, died February 28 at his home in Shreveport. Regarded as an authority of production matters, Baird served three successive terms as president of the Mid-Continent Oil & Gas Association beginning in 1923. He was made receiver in charge of properties of Gilliland Oil Co. in 1921 and carried out a drilling campaign which earned more than $5,500,000 for the company.

Frank C. Madery, 60, in charge of production of J. & J. Kerr Co. in the Petrolia, Ont., field, died recently. A native of Detroit who came to Petrolia at the age of 16, Madery also engaged in the manufacture of leather oil-well-valve cups.

John L. Coates, 54, assistant treasurer of General Petroleum Corp., died recently in Los Angeles.



SPECIALISTS IN STEEL

Engineers and craftsmen of Consolidated Steel Corporation know their business well. The unusual steel structures shown here are examples of the diversity and precision of their work.

Should your plans call for new construction, consider the capable services of Consolidated Steel. Immediate attention will be given your inquiry. Address Consolidated Steel, Los Angeles 22, California; or Orange, Texas.

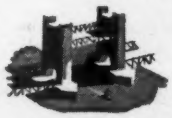
LEADERS IN THE WEST AND SOUTH

Consolidated Steel

FABRICATORS
ENGINEERS
CRAFTSMEN

INDUSTRIAL BUILDINGS

DRUM GATES

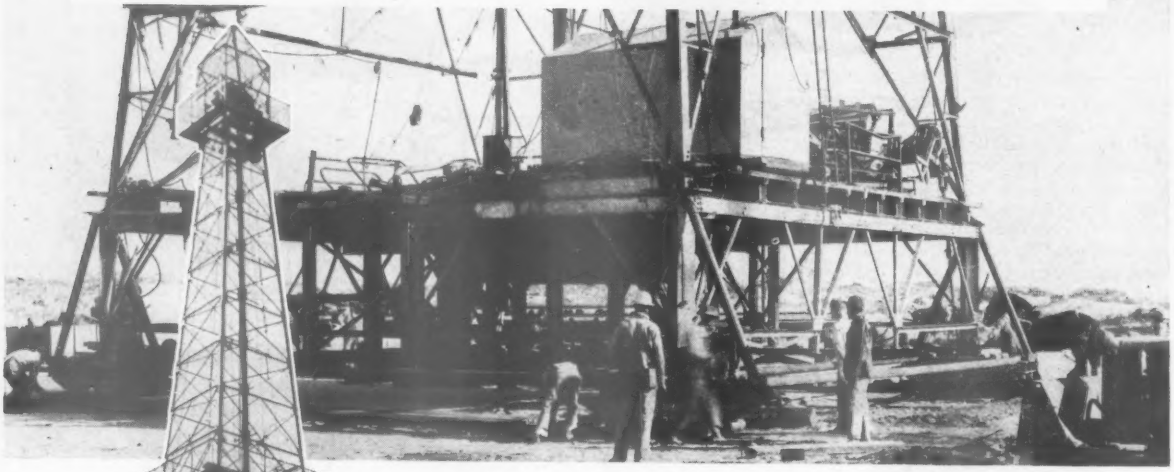


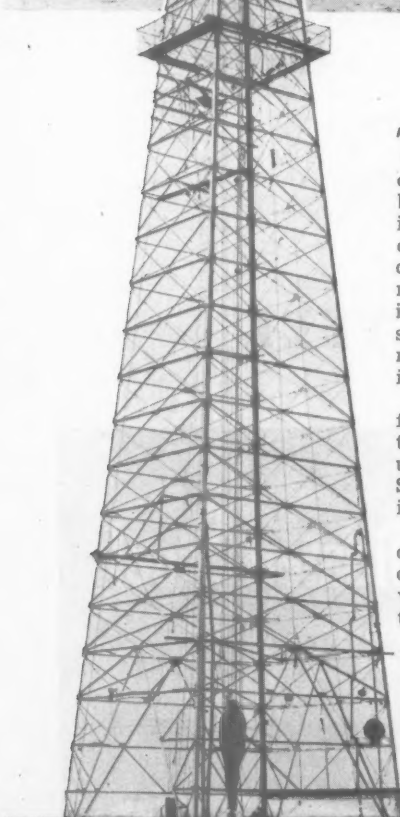
STEEL BRIDGES

PETROLEUM EQUIPMENT

TRANSMISSION TOWERS

World's Largest Derrick "Walked" Across West Texas Sand Dunes





by E. H. Short, Jr.

THE skidding of fully rigged derricks from one location to another, or even greater distances, has been, for some time, common practice in several oil-producing areas. However, Shell Oil Co., Inc.'s recent feat of providing the world's largest derrick with shoes and literally walking it for more than ½ mile over the sand hills of West Texas is an engineering accomplishment of unusual interest.

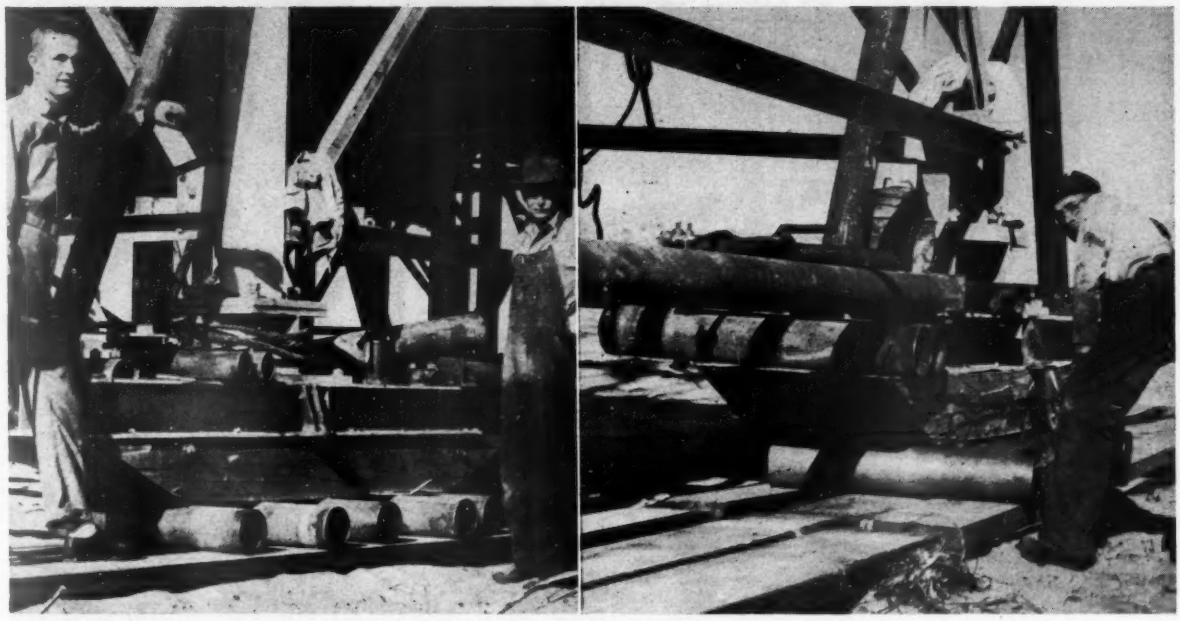
The height of this derrick is 203 ft. from the base of the substructure to the top of the gin pole. Its base measures 38 by 38 ft. It was skidded from Shell 7 Sealy Smith to 10 Sealy Smith in the Monohans field.

Preliminary to the actual moving of the derrick, a fairly level skidway, or road, approximately 70 ft. in width was scraped over the sand hills from the well location to the new location. This work was accomplished by six bulldozers in a period of 3 days.

While the building of the road was in progress, the derrick was placed in readiness for the ½-mile trek across the sand dunes. The draw works was removed since the weight would impose too great a load on the unsupported substructure. In the accompanying photographs it will be noted that the traveling block (fully strung), auxiliary equipment, standpipe, and lighting equipment were permitted to remain in place. The doghouse, which bordered the derrick floor during drilling operations, was simply shoved on to the derrick floor and carried with the derrick.

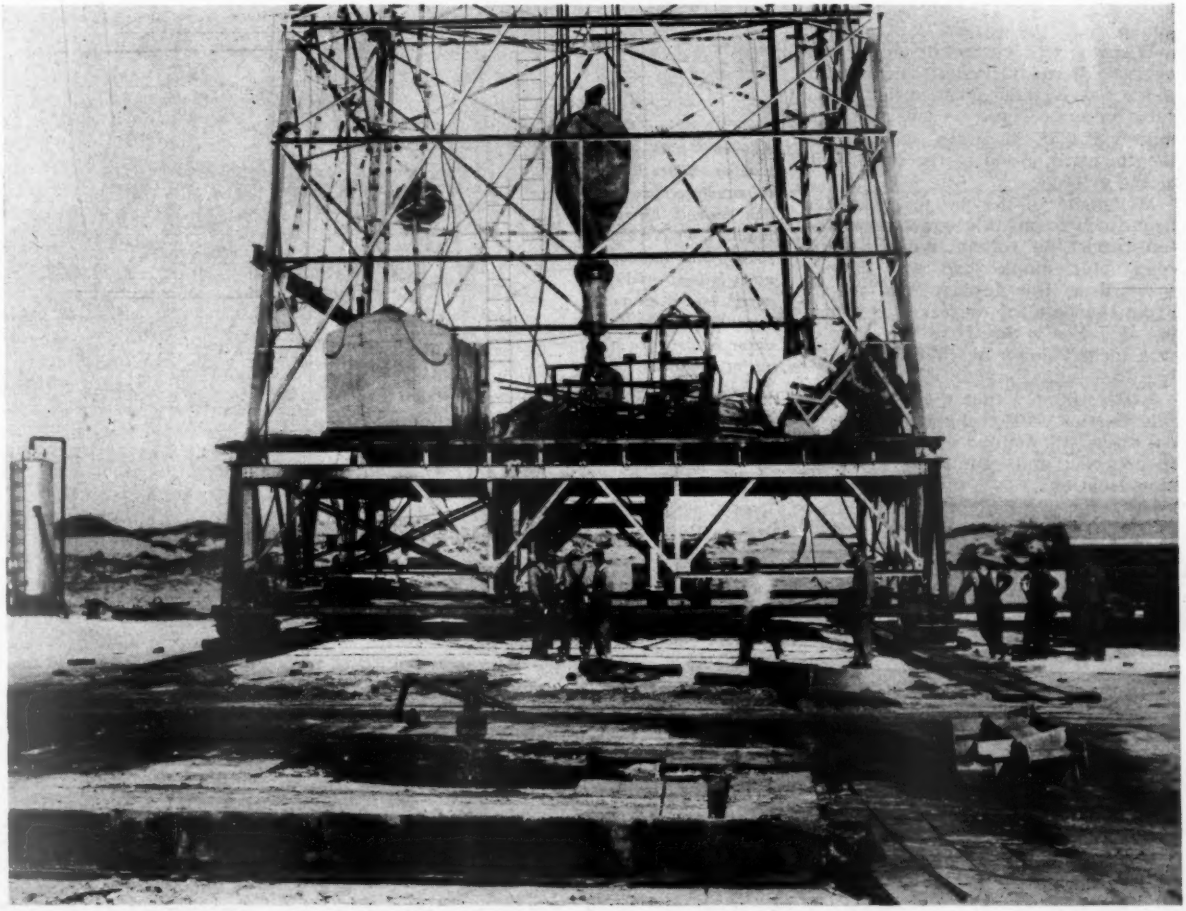
The entire derrick with its allied equipment weighed approximately 125 tons; and while this weight is substantial, the towering height and shape of the derrick are the features

Top of page: Rigging up to "walk" Shell Oil Co., Inc.'s 203-ft. derrick over a half mile of West Texas sand dunes. Below: Pulling derrick off of location. Teams are used to carry board track forward as skidding progresses



Left: Closeup showing wooden shoes placed under corner of derrick substructure and rollers used in skidding derrick to new location. Right: Closeup showing board track over which derrick was skidded, rollers, and wooden shoes used under corners of substructure. Note pipe used to brace substructure during movement

Below: Derrick has been pulled off of well site



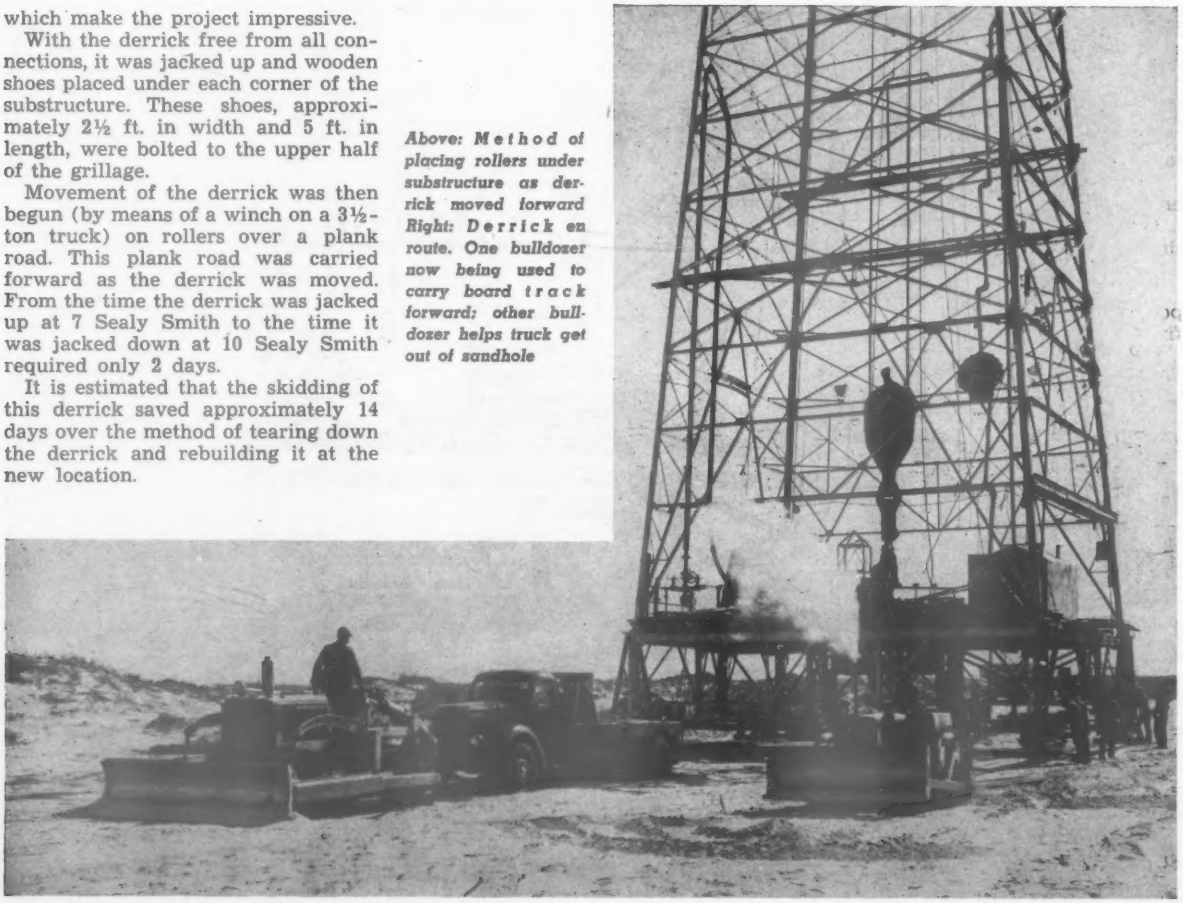
which make the project impressive.

With the derrick free from all connections, it was jacked up and wooden shoes placed under each corner of the substructure. These shoes, approximately 2½ ft. in width and 5 ft. in length, were bolted to the upper half of the grillage.

Movement of the derrick was then begun (by means of a winch on a 3½-ton truck) on rollers over a plank road. This plank road was carried forward as the derrick was moved. From the time the derrick was jacked up at 7 Sealy Smith to the time it was jacked down at 10 Sealy Smith required only 2 days.

It is estimated that the skidding of this derrick saved approximately 14 days over the method of tearing down the derrick and rebuilding it at the new location.

Above: Method of placing rollers under substructure as derrick moved forward Right: Derrick en route. One bulldozer now being used to carry board track forward; other bulldozer helps truck get out of sandhole



Selecting a Rotary Pump

by Warren E. Wilson

MOST rotary pumps at present operate in the range 600 to 2,400 r.p.m. In accord with this fact, three ranges of operating conditions are identified on the basis of the viscosity of the liquid pumped. There are very definite performance characteristics which are predominant in each range. The viscosities selected are average dividing values and should not be considered as definite fixed values.

In Table 1 are shown the three operating ranges along with a description of the salient characteristics of the operation in each.

Operation of the Rotary Pump

The rotary pump has as its basic operating characteristics (1) a trapping of a definite volume of fluid by virtue of some geometrical feature of the unit, whether it be a gear pump or vane pump or any one of the multitude of variations of these two fundamental types, and (2) a transporting of this trapped fluid from the inlet to the outlet by the motion of the pump rotor.

In order to effect this transportation of the fluid it is necessary to apply a torque to the shaft sufficient in magnitude to equal the sum of the following torques which resist the rotation of the shaft:

A. Torque due to pressure difference between inlet and outlet.

B. Torque due to viscous drag on the rotor.

C. Torque due to bearing friction.

D. Torque due to friction at any point of contact between moving and fixed portions of the pump.

While it is true that the full displacement of the pump is pumped at each revolution of the rotor there is a reduction in the useful delivery of the pump since a certain portion of the fluid leaks back from the outlet to the inlet. This is due to the pressure flow through the narrow passages between moving and fixed parts of the pump. As a result of the various resisting torques and the reduction in delivery due to slip the hydraulic output of a rotary pump is always less than the mechanical input. The mechanical input is simply the product of the driving torque and the speed of rotation of the shaft expressed in consistent units. The hydraulic output is the product of the delivery and the pressure differential, again expressed in consistent units.

To obtain best performance it is obviously necessary to keep the resisting torques and the slip at a minimum. It is unfortunately true that anything which is done to decrease the viscous torque will increase the slip. There are, however, optimum conditions for slip flow and viscous torque which yield best over-all results. Any reduction which may be effected in the other resisting torques is a definite advantage and can almost without exception be effected without in any way adversely affecting the delivery of the unit.

The author since 1936 has been acting as consultant in various fields of hydraulics. Following 8 years of teaching hydraulics and mechanics in various engineering colleges, he joined Armour Research Foundation, where he was chairman of fluid mechanics and thermodynamics research until October 1945. He is author of several papers on hydraulics, and is a member of numerous engineering and scientific societies. His alma maters include Lehigh, Cornell, and Iowa universities, and California Institute of Technology. In this article he outlines the factors and characteristics of rotary pumps, and points out a procedure to use in selecting them for various applications with the aim of obtaining long life and economical operation.

Factors for a Specific Application

Since the quantity to be pumped and the pressure differential against which pumping will take place are fundamental, accurate knowledge of the magnitudes of these quantities is essential. The slip and viscous drag are directly dependent upon the viscosity of the fluid which is to be pumped. Since the viscosity is markedly affected by the temperature, it is essential that the viscosity of the fluid at any temperature and the probable pumping temperature of the fluid be known.

The life of a rotary pump is dependent to a great extent upon the cleanliness of the fluid which is pumped. Solid particles in the fluid are very likely to damage the moving and fixed parts of the pump if they become lodged in the small clearance spaces between the rotor and housing.

One should be thoroughly acquaint-

TABLE 1—PERFORMANCE AND DESIGN CHARACTERISTICS OF ROTARY POSITIVE DISPLACEMENT PUMPS

SPEEDS 600-2,400 R.P.M.

Viscosity at Pumping temp.	Delivery	Torque input	Design features
0 to 100 S.S.U.	Slip proportional to the square root of the pressure differential and practically independent of the viscosity. Vaporization due to reduction of pressure near inlet causes reduced delivery.	Friction torque due to thin-film lubrication is of considerable magnitude. Viscous torque due to thick film shear is practically negligible.	Clearances must be very small to keep slip at a reasonable value. Bearings must be lubricated. The alignment must be maintained with great accuracy.
100 to 2,000 S.S.U.	Slip proportional to the pressure differential and inversely proportional to the viscosity. The delivery is reduced by entrained air or vaporization at the higher speeds and viscosities.	Thick film viscous drag produces important retarding torque which is directly proportional to the product of the speed and viscosity. Thin film friction should be small.	Optimum performance may be obtained in this range by proper design which balances torque loss and slip. Bearing and seal friction should be at a minimum.
2,000 S.S.U. and over	Negligible slip but the delivery is reduced by presence of entrained air which is released and expanded in low pressure region near inlet.	Thick film viscous torque usually very large. Local heating of liquid causes decrease in viscosity and viscous drag.	Inlet geometry and vane or gear tip shape of prime importance to reduce loss in delivery due to entrained air. Clearances should be large to reduce viscous torque.

ed with the load characteristics giving particular attention to any variations in quantity, pressure, or viscosity. If there are any limitations on the speed of rotation of the shaft which may be imposed by the nature of the available prime movers such facts should be at hand.

Range of Performance Expectancies, Durability

To judge the merits of various pumps it is necessary of course to have some knowledge of the best performances which may be expected and of minimum acceptable standards. In Table 2 are shown the most important performance characteristics of a rotary pump with three values, minimum acceptable, average, and best which may be expected.

It is difficult if not impossible to lay down in concrete form criteria for the life of a pump, hence nothing is included in Table 2 to assist in judging the durability of a rotary positive displacement pump. However, the same features contribute to the long life of such a pump as contribute to the long life of any machine. For example, adequate bearings are essential not only to reduce friction torque but also to maintain the alignment of the various parts. This latter requirement is especially important since the clearance between fixed and moving parts are always very small and the least misalignment may cause interference of various surfaces. Lubrication is a factor of prime importance but need not cause special concern except when the liquid which is being pumped has no lubricating qualities.

If the pump is to be used for high-pressure work, particular attention should be paid to the type of seal which is used to prevent leakage between the rotating shaft and the housing. Leakage must be kept at a minimum but care must be exercised to see that an unreasonable load is not incurred by developing extremely large friction torques between seals and rotating shaft.

Many manufacturers have adequate data available to determine performance under various operating conditions. It is, however, frequently difficult to obtain information concerning the performance of a given pump under conditions of operation which are somewhat unusual. For example, if it is desired to pump oil with a viscosity exceeding 4,000 S.S.U. some difficulty may be experienced in obtaining accurate performance data. The reason is clarified by reference to Table 1 and detailed consideration of the performance characteristics outlined there.

1. Pumps in Low Viscosity Range

Pumping of light oils, solvents, and water is covered by the range of operation headed viscosity 0-100 S.S.U. Principal feature here is the relatively great magnitude of the slip. The slip under these circumstances will usually vary with the square root of the pressure differential and be essentially independent of the viscosity of the fluid. The viscous drag is practically negligible with fluids of such low viscosity. However, if load-carrying surfaces are lubricated by this liquid of low viscosity excessively high friction torques will be developed. While viscous torque increases with increasing speed, one finds that the torque due to inadequate lubrication increases as the speed decreases, provided load and viscosity remain constant. This type of lubrication is known as thin-film lubrication and is quite unstable making it extremely difficult to predict the probable magnitude of the resulting retarding torques.

Improper design of intake ports and channels may lead to serious difficulties when pumping liquids of low viscosity since these liquids generally vaporize readily. Faulty inlet design results in markedly reduced pressures on the intake side of the pump which in turn cause the formation of vapor pockets in the liquid. The formation and subsequent collapse of such vapor pockets are the essential factors in the phenomenon known as cavitation which frequently causes the complete ruin of hydraulic machines and structures.

2. Pumps in Medium Viscosity Range

Pumping of medium oils, with viscosity in the range of 100 to 2,000 S.S.U., is favored by the best conditions for rotary-pump performance. The pumps may be made self-lubricating, slip and viscous torque may be reduced to such balanced values that maximum attainable efficiency is realized. In this range, operation is characterized by a slip flow which is directly proportional to the pressure difference and inversely proportional to the viscosity of the fluid. The viscous torque is directly proportional to the product of the speed and the viscosity.

3. Pumps in High Viscosity Range

Pumping of extremely viscous oils will be found to be accompanied by very little if any slip, a high viscous torque and a reduction in delivery due to entrained air. Certain details of the performance in this range are worthy of consideration. Conventional pumps are so tightly fitted that no appreciable slip, which is inversely proportional to the viscosity and directly proportional to the pressure differential, is detectable. However, this tight fitting results in a viscous torque so great in magnitude that the heat generated by its action raises the temperature of the oil to such an extent that the viscosity is noticeably reduced. This reduction in viscosity in turn results in a reduction in viscous drag. However, the heating is definitely undesirable in spite of its tendency to reduce the drag since the local heating may well cause distortion of the pump.

Reduction in delivery due to air or vapor entrained in highly viscous oils arises from the fact that there is, under ordinary conditions of operation, little pressure in excess of atmospheric available at the pump inlet. In fact, lengthy approach lines will cause pressures considerably below atmospheric at the inlet. The difference in pressure between inlet and rotor is the only source of a force to drive the liquid into the spaces in the rotor provided for the trapping of the liquid.

If the pressure at the rotor falls to the vapor pressure of the liquid or even to a point somewhat above that point, entrained vapor will expand and fill the space intended for trapping of the liquid. This mixture of vapor and liquid will be transported to the high-pressure side of the pump. The volume of the vapor will be reduced by the high pressure and the volume of liquid delivered is obviously much less than the ideal amount. Elimination of this difficulty has been attempted by specifying certain maximum peripheral speeds of the rotor. This limitation on speed results in a definite restriction on the amount of oil which may be pumped in a given time. It would seem more desirable to design pumps specifically for this service and obtain high enough deliveries to make the pumping operation economical. While it is impossible to obtain unlimited speeds by suitable design, the importance of such design is clear.

Construction Points to Look For

Certain details of construction are considered good practice and should always be looked for when selecting a rotary pump. Since the pressure is

TABLE 2—RANGE OF ROTARY PUMP PERFORMANCE EXPECTANCIES

Type of performance—		Minimum	Good	Best
Volumetric Efficiency	$= \left(\frac{\text{Actual Delivery}}{\text{Ideal Delivery}}\right)$	90%	95%	98%
Torque Efficiency	$= \left(\frac{\text{Ideal Torque Input}}{\text{Actual Torque Input}}\right)$	85%	90%	92%
Over-all Efficiency	$= \left(\frac{\text{Hydraulic Power Output}}{\text{Mechanical Power Input}}\right)$	75%	85%	90%

high at the discharge and low at the inlet, large unbalance forces on the pump rotor are inevitable in the case of single-acting units unless special features are included in the design to eliminate the unbalance. Small channels within the housing or rotor are frequently provided to permit the passage of high-pressure fluid to regions of low pressure thus relieving at least a portion of the unbalanced force. Serious stresses may be caused that could engender failure.

In certain types of pumps, notably gear pumps, there is a tendency for the oil to be trapped and compressed due to geometrical features of the gear form. Such action is fatal to the pump since enormous pressures are generated and permanent deformation of the gears and shafts may well be caused. Various means are employed to eliminate this difficulty, chief among which is the use of narrow channels through which the trapped liquid may flow and relieve the pressure. Proper location and sizing of the channels are essential to satisfactory operation.

Most pumps are designed for operation in the middle range, i.e. with oil of viscosity between 100 and 2,000 S.S.U. It follows therefore that certain limitations on the performance are inevitable if operated with oils or solvents of extremely low viscosity or oils of extremely high viscosity. However, a well-designed and properly lubricated pump should give satisfactory service throughout a wide range of operating conditions.

A Convenient Rule to Use

A rather simple and quite dependable rule of thumb is that the overall efficiency of the pump will be approximately the same for a given pressure differential provided the product of the speed and viscosity remains constant. For example, if the peak of the efficiency curve for a pump operating at a pressure differential of 500 psi. with 500-S.S.U. oil is at 1,800 r.p.m., the same efficiency will be obtained at 500 psi., 250 S.S.U. and 3,600 r.p.m. or at 500 psi., 1,000 S.S.U. and 900 r.p.m.

One may extend the aforegoing rule somewhat to include the pressure differential provided operation is at relatively high pressures, say 200 psi. and over. Under these circumstances the peak efficiency will occur at a particular value of the quantity

$$\frac{\text{Viscosity} \times \text{Speed}}{\text{Pressure Differential}}$$

For example, the pump described above would have a peak efficiency under any one of the following sets of conditions:

Pressure differential psi.	Viscosity S.S.U.	Speed r.p.m.
500	500	1,800
250	250	1,800
1,000	1,000	1,800
1,000	500	3,600

This rule can not be considered reliable for viscosities in excess of 2,000 S.S.U. or less than 100 S.S.U., pressure differentials less than 200 psi. and speeds in excess of about 2,800 r.p.m.

Due to the nature of the variation of the slip and viscous drag it is impossible to design a single rotary pump which will operate wholly successfully over a very wide range of viscosities, speeds and pressure differentials.

The selection of a rotary pump in competition with a centrifugal pump is limited somewhat by the fact that there are not commercially available rotary pumps designed for service in many of the situations which call for large deliveries at high-pressure differentials. However, it should be recognized that the large rotary pump is inherently more efficient than the small rotary pump and may become available when some of the more recent developments in pump design become widely accepted. There appears to be no physical limitation on the size of a rotary pump which would not also limit the size of a centrifugal pump. The life of the well-designed rotary pump should compare favorably with that of the centrifugal pump provided the fluid which is pumped is clean.

Conclusions

In specifying performance characteristics for a rotary pump the buyer should find it possible to call for a pump with an over-all efficiency well above 75 per cent. This efficiency should not fall below 70 per cent for a range of the product of speed and viscosity from 0.2 to 5 times the ideal value corresponding to peak efficiency or for a similar range in the value of the factor

$$\frac{\text{Viscosity} \times \text{Speed}}{\text{Pressure Differential}}$$

if the pressure differential exceeds 200 psi. If a pump is designed for a specific duty, peak efficiency should exceed 80 per cent and in the case of 5-hp. units and larger should be between 85 and 90 per cent. The buyer should make certain that the manufacturer has available actual performance data covering operation outside the usual range if he has in mind the use of the pump at unusually high speeds, high pressures or with extremely high or low viscosities of the fluid. The extrapolation of performance data is possible but should be undertaken only by those thoroughly familiar with the underlying theory of the operation of the rotary type positive displacement pump.

In general it is deemed undesirable to attempt to pump liquids of widely different viscosities with the same pump unless speed is changed to compensate for change in viscosity. The pumping of extremely viscous oils in this manner is, however, unduly costly since delivery is reduced directly as the viscosity is increased. Separate pumps are recommended for operation in each of the three ranges specified previously.

Great improvements have been made recently in rotary pump design and manufacture generally are acquiring more and better performance data. New catalogues will be found to have more complete performance data although care must be exercised in its interpretation in many cases to avoid unjustified conclusions. A buyer making intelligent use of this material can obtain much greater value for his expenditure in purchasing rotary pumps than can one who buys at random.

BOOKS

PETROLEUM PRODUCTION. By Park J. Jones. Published by Reinhold Publishing Co., New York, N. Y. 228 pp. $4.50.

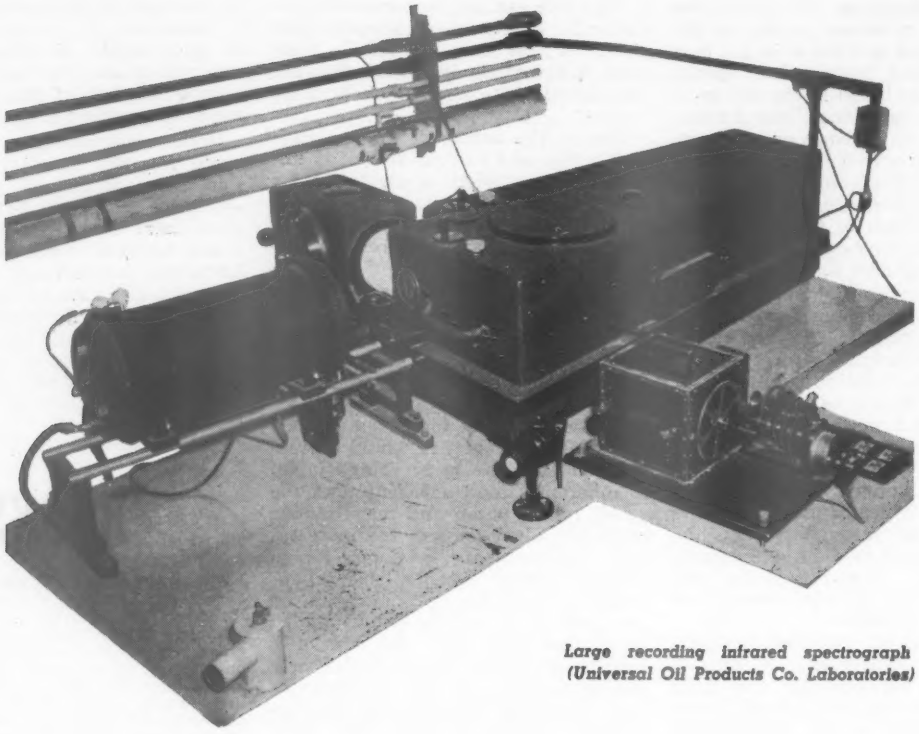
This book will occupy at once an unique position as a text in the science and applied engineering of producing oil, condensate, and natural gas. Back 15 years or so ago other books ranked in somewhat similar position, although in that era the producing of hydrocarbons and the technology thereof, or petroleum engineering, was almost wholly concerned with the mechanical operations. There were no reservoir engineers, little of formation characteristics, and electric logging, material-balance studies, multiphase fluid-flow fundamentals, displacement factors, cycling calculations were yet to be born. Since these advances have been made various sources have treated certain of the new subjects, but Jones' work brings the many new phases of reservoir mechanics and the theoretical concepts of petroleum production into a unified whole. Of considerable aid are the numerous examples given which illustrate, in actual numbers and field units, the practical solving of many reservoir problems.

ADDITIVE ENGINE OILS. Published by Petroleum Educational Institute, 704 South Spring Street, Los Angeles. 150 pp.

This work is an effort to contribute further to the elementary material already published in the subject of petroleum and its products, and also to collect and make available, in one book, many scattered contributions of great value. The text gives a short and simple explanation of detergent oils and detergent purging fluids, for the benefit of maintenance personnel at service stations, car and truck dealers, repair shops, and fleet operators. The volume is copiously illustrated with simple line drawings, for easy understanding. A reading of the book should provide a working knowledge of the part additives play in engine oils.

PIPING HANDBOOK. By Sabin Crocker. Fourth Edition. Published by McGraw-Hill Book Co., 330 West 42nd Street, New York. 1,376 pp. 334 illustrations. $7.

This handbook makes available to the engineer, designer, and contractor a vast compilation of data necessary to the effective use of piping in all its engineering and industrial applications—steam and power-plant piping, heating and plumbing systems, oil and gas piping—everything from water distribution to hydraulic systems for airplanes. The book authoritatively covers scientific fundamentals, materials, and design and installation practice, and gives many useful and dependable construction details, cost analyses, dimensional standards, material specifications, charts, and formulas.



Large recording infrared spectrograph (Universal Oil Products Co. Laboratories)

Identifying HYDROCARBON MIXTURES

PROJECTED through prisms of rock salt or crystalline quartz, infrared and ultraviolet rays that cannot penetrate the clearest glass nor be seen by the human eye, are daily identifying and analyzing liquid and gaseous hydrocarbon mixtures in the physics division of Universal Oil Products Co. laboratories, thereby adding to the knowledge about petroleum and methods of obtaining the greatest possible values from it.

Other equipment and methods used in the physics division include X-ray diffraction and electron diffraction, surface-area measuring equipment and a wide variety of physical and electrical apparatus for determining various properties of oils and catalysts, such as dielectric constants, porosities, freezing points, and so on.

Infrared rays are those which warm when radiated from a stove, an electric heater, or other hot surface. Ultraviolet or actinic rays are those superardent radiations which blister the human skin when it is imprudently exposed to the sun.

Costly and delicate apparatus has been developed for this type of research, the purpose of which is to discover facts that are directly applicable to the immediate or future improvement of refining operations and which ultimately redound to the benefit of every user of gasoline and all refined products, including rubber, detergents, and other derivatives producible commercially from crude oil.

Greater Usefulness

These modern techniques do not supersede nor invalidate the time-honored distillation, viscosity, gravity, pour test, and other physical and chemical tests which for so long have been standard in the refining industry, but their range of usefulness goes far beyond that of the older methods.

The invisible light rays reveal important characteristics of individual hydrocarbons that cannot be discovered by any other method; furthermore, they permit many of the standard determinations to be made in a fraction of the time required by former procedures and with greater accuracy; for example, analyses of toluene, xylene, butadiene, and alkylate.

Explaining in a few words the function of the invisible rays, a physicist says:

"A refiner's gasoline may look water white, but to the ultraviolet and infrared 'eyes' of the physics-department instruments, it exhibits a myriad of 'colors' unseen by the human eye, which serve to characterize it more rapidly and more thoroughly than the older methods."

The same principle governs both infrared and ultraviolet procedures and the apparatus in both cases is similar. It consists of a source of radiation such as a mercury arc lamp or incandescent body, a prism (quartz or rock salt) to classify the rays according to wave length (color) and a detector. The rays pass through the hydrocarbon sample to the detector which measures the quantity of radiation not absorbed by the sample. The variation of this value at different wave lengths or colors, discloses to

the technologist the identity of the material being tested.

The results of the information so secured, along with the results obtained from data derived by other scientific methods in the various departments of the U.O.P. laboratories, are used to help solve the problems of licensee refiners. Thus is put into their hands more complete information than they ever had before. This enables them to evaluate and realize the potential values of the crude they run and to improve operations. It also points the way to the possibility of making new and more valuable products from petroleum.

Another major function of the physics division is the study of catalysts. As every refiner knows, catalysis was the key to victory in the air in World War 2, and it is a factor of growing importance in peacetime industry.

The millions of barrels of aviation gasoline (100 octane and better) produced for fighting planes was almost entirely custom built by use of a group of catalytic processes with catalytic cracking playing the leading role and catalytic polymerization, alkylation, isomerization, hydrogenation, and dehydrogenation having important parts.

Large quantities of synthetic toluene and other aromatics were made from petroleum by catalytic methods. The chief components of buna-S rubber, namely, styrene and butadiene, are produced by catalytic techniques.

Catalyst Behavior

In applying catalysis to practical peacetime uses, the character and fundamental behavior of various catalysts are of vital interest to refiners. The important characteristics which determine the performance and life of a catalyst include chemical composition, method of preparation, density, porosity, surface area, crystalline structure, and particle size.

Innermost secrets in the makeup of catalytic materials are laid bare by X-ray and electron diffraction techniques. The X-ray equipment consists essentially of a source of radiation (X-ray tube), a "slit system" which is a tube perforated by slits or pinholes to define the beam, and a photographic film, arranged as a cylinder with the sample under test in the center. The X-ray is popularly known for its ability to pass through solid bodies. However, in catalyst testing, it is the radiation which is deflected by the sample that tells the story.

Small-angle X-ray scattering camera (Universal Oil Products Co. laboratories)

The X-rays are projected through the slit system onto the sample. Some of the radiation is absorbed by the sample—a portion is deflected by it. The deflected rays strike the film at various positions where they are recorded. After the test, the distances between the positions are measured. These distances indicate the arrangement of atoms in the sample, the atomic arrangement in turn betraying the identity of the material just as a thumbprint identifies a felon.

Another powerful tool for investigating fundamentally important properties of a catalyst is the electron microscope. The standard form of electron miscroscope takes shadow pictures, magnified as much as 150,000 times. Pictures are taken by this instrument of individual large molecules which cannot be photographed by any other known method.

Modified Electron Microscope

The electron microscope in the physics division has been modified to permit the study of crystalline structure of catalysts by electron diffraction. The construction of the electron microscope is analogous to that of the ordinary optical microscope, but whereas the optical instrument operates in the air on a beam of daylight or artificial light, the electron microscope operates in a vacuum on a beam of electrons derived from a heated tungsten filament. The electron beam is focused by means of magnetic coils which are analogous to the glass lenses of the optical microscope.

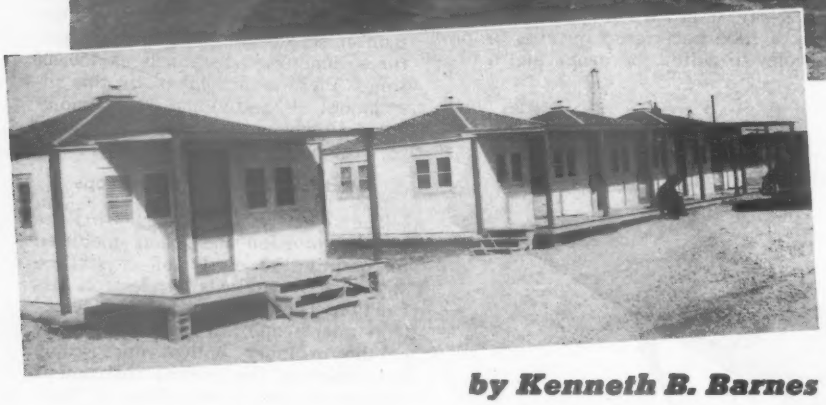
Information developed by the X-ray and electron microscope techniques was a major contribution to the development of the catalysts used in the scores of large-scale catalytic units which made up the wartime 100-octane gasoline facilities, and was partly responsible for keeping production of gasoline at the highest possible level.

The novel improvements in the catalyst used in the U.O.P. modified fluid catalytic cracking unit were developed in part from data derived in the physics department.

More than one refiner is enjoying more profitable operations today because of techniques and facts discovered in the physics division and other departments of the U.O.P. laboratories.

The work of this division has been increasing in scope and importance for several years. To permit continued expansion, a functional building which will house the apparatus, laboratory, and personnel of the physics division is nearing completion.

Townsite Drilling Campaign Latest Development in Complex Cement Pool



Above: Looking westward across the Cement townsite where 10 oil wells and 13 gas wells recently have been completed by H. W. Snowden Oil & Gas Co., Ltd., of Dallas. In the projected 100-well development, 15 rigs are operating, including those of Mohawk Drilling Co., B. & B. Drilling Co., English Drilling & Producing Co., H. W. Snowden, Stephens Petroleum Co., Bryan and Frizzell, Fred Morgan, Apex Drilling Co. Left: Prefabricated buildings were quickly set up at Cement by the Snowden organization to house their geological, supervisory, operating, and equipment activities

by Kenneth B. Barnes

This article tells how the Cement townsite is being developed, orderly but swiftly, in several of a possible dozen different pays. The program is all by one operator, and the tracts are unitized. The deeper and thick Medrano and Marchand reservoirs in the area also are discussed. Very little has been published on this field other than in the Journal and in early geological reports.

ALTHOUGH clearly shown up by an excellent surface anticline, and well dated by development starting 30 years ago, the Cement pool in Caddo County, southwestern Oklahoma, has another new activity. This time it is in the very heart of the 13,000 productive acres—in the town itself. The current scene, however, is only one of a series of unusual events that have occurred periodically since the original discovery, as new sands in the Pennsylvanian formations and unexpected conditions have unfolded. Moreover, the additional prospects that lie at depths up to 15,000 ft. or so are considered promising and a good potential for the future.

Background for Present Unitized Project

The field long has been regarded as the most complex oil structure in the Mid-Continent area. How a sizable drilling campaign could suddenly spring forth in the townsite of Cement, which is located between the east and west domes of the 10 by 2-mile field, can only be explained by the difficult geological, reservoir, and engineering phases that have attended the whole area.

The Cement field is in third place in Oklahoma's present oil-production column. The townsite has been surrounded on three sides by oil production, in fact, a number of very good—1,500 to 5,000-bbl.—oil wells were completed on the south edge just before the start of the war. These were some of the factors that started the swift 100-well drilling campaign now in progress in the little town.

This intensive development project, however, is totally unlike many previous townsite drilling booms where highly competitive drilling took place virtually from townlot to townlot. At Cement, one producing organization owns leases on all of the platted and subdivided parcels and these have been unitized into eight different tracts, each approximately 40 acres in size. The multireservoir conditions are being tested and arranged into a gridwork of producers, one from one sand, the next from another of the dozen present.

Project Commenced in 1945

Development work in the town of Cement, which is located within Section 3-5n-9w, is being conducted by H. W. Snowden Oil & Gas Co., Ltd., of Dallas, with A. Lacy Rollins, Oklahoma City, acting as one of the representatives of the concern; E. S. Arnn as production superintendent, and Lloyd Hoagland as geologist. The activity was commenced after purchase of properties from G. C. English and C. O. Doss at a reported price of $2,000,000. This has been stated to include 740 acres and 26 producing wells, and other acreage acquisitions also have been made in the area.

So far the firm has completed 13 gas and 10 oil wells, has 13 rigs working on their drilling operations, and 2 more rigging up.

First completion in the Snowden project in the townsite was 1 McDonald in June 1945, for approximately 300 bbl. per day, in the Middle Rowe sand. The largest gas well so far has been 2 City Park in the lower Rowe sand, with an open flow capacity of 80 million cubic feet per day and a closed-in rock pressure of 1,600 psi. Size of the oil-well completions

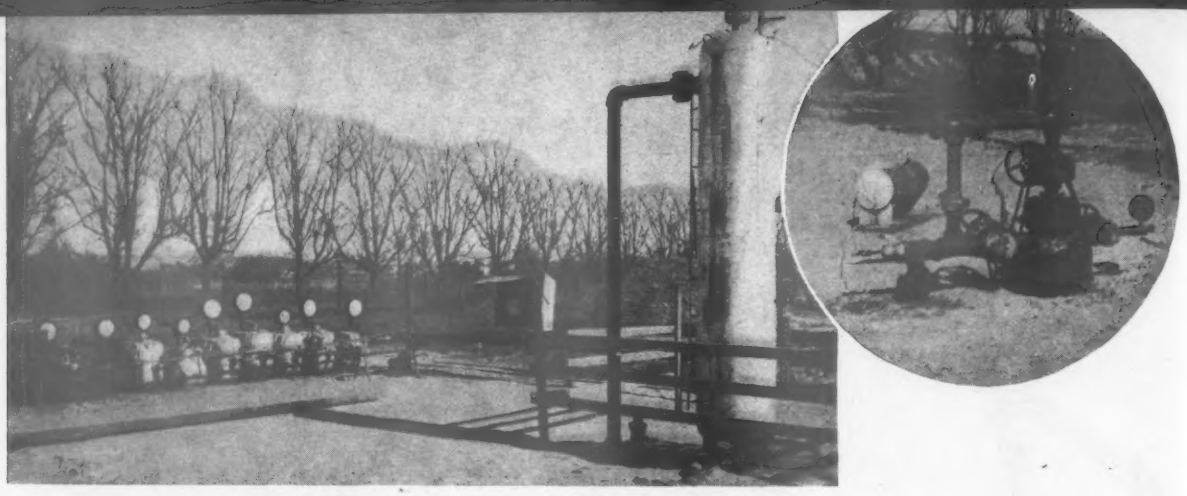
For Increased Leaded Octane Ratings—

PERCO CATALYTIC DESULFURIZATION

Perco Catalytic Desulfurization represents an easy, inexpensive solution to the problem of manufacturing higher octane motor fuel. If you are faced with the job of improving the quality of your product, a Perco engineer will give you further details about licensing this profitable process.

PROCESSES • ENGINEERING
PERCO
RESEARCH • CONSTRUCTION

A DIVISION OF PHILLIPS PETROLEUM COMPANY



The drilling campaign is fueled by the combination gas-oil well shown at right. The separator in left view operates at 300 psi. The gas flow then successively passes through the master orifice meter, the small horizontal heater, a pressure regulator (set at 40 psi.), and splits among nine positive displacement meters and individual supply lines

generally has ranged between 100 and 600 bbl. per day. Of the 10 oil wells to date, 3 have been pumpers and the others have flowed naturally.

Detailed plans for a natural-gasoline plant in the field have been considered, but shortage of materials has delayed any actual start of construction. At the present time, Snowden's gas production is being sold to Oklahoma Natural Gas Co. and Consolidated Gas Co., long-time purchasers in the area.

Drilling Details

Depth of the present townsite wells averages about 4,500 ft. and total elapsed time to complete a well runs about 30 days, including moving in and tearing out. Blowout preventers are used at all times and careful attention is paid to the obtaining of straight holes, particularly from a point starting at 3,000 ft. Mud conditions are also checked and adjusted continuously from this depth.

The Noble-Olson sand is predominantly an oil horizon and found at 3,400± ft. Oil or gas production, or both, are obtained in four different sections of the Rowe sands, between 3,700 and 4,300± ft., in the Yule sand at 5,200± ft., and in the Wade sand at 5,300± ft. The Marchand sand here is believed to occur at about 6,300 ft., and the upper Kistler at 5,500± ft. (on the south and upside of a major fault). These latter two, however, and other lower sands known in the area have not yet been drilled.

Usual casing program is to set 10¾- at 400 ft., and a 7 or 5½-in. oil string which is cemented with 1,000 to 1,500 sacks. In the case of the Noble-Olson and sometimes the Rowe sands, the casing is cemented on top and the sand penetrated by drilling in with tubing. The Yule and Wade completions are made by setting casing through the productive section, cementing, and gun perforating.

Deep Stratigraphic Reservoirs

Overshadowing and exceeding in importance and interest any other of the various previous phases of the many-sided Cement field has been the recent development of the Medrano and Marchand sands. These two formations at Cement are the thickest, in net permeable footage, of any oil sands in the state, and each reservoir has a number of interesting conditions present.

Medrano sand belt.—This sand is a flank deposit at about 5,600-6,000 ft. which lies along the south flank of the west dome. Data from five wells show the following average characteristics:

MEDRANO CORE ANALYSIS—WEST CEMENT

Feet of sand	Permeability (md.)	Porosity (%)	Connate water (%)	Residual oil (%)
127	146	15.2	25	*20

*From rotary cores considered to be completely flushed.

Permeable capacity for the above conditions is 127 ft. by 146 md., or 18,542 ft.-md.

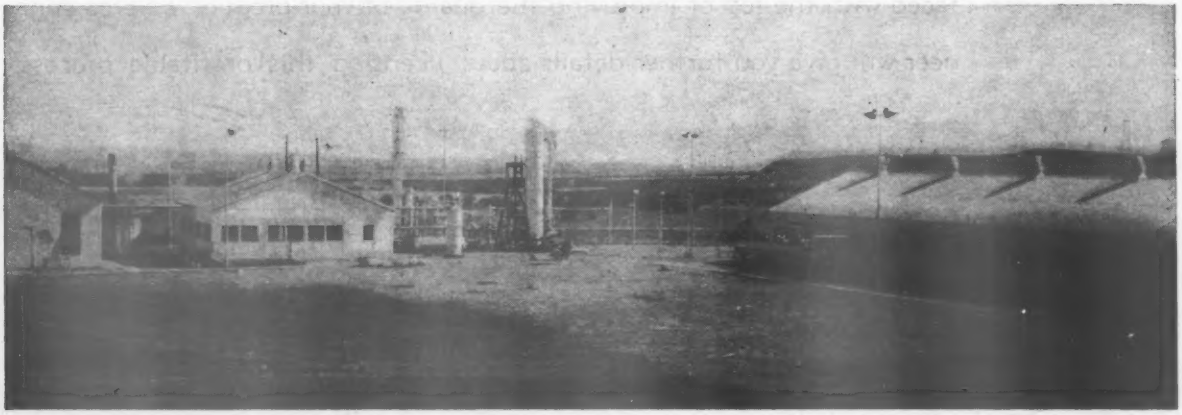
Engineers have applied the above and other data for the following determinations:

Productive capacity, as barrel per day for a given reduction in bottom-hole pressure:

$$\frac{5.9 \times 10^{-4} \times 18{,}542 \text{ ft.-md.}}{1.25 \text{ (oil volume factor)} \times 2 \text{ (viscosity, Cp.)}} \Delta P = 4.37\,\Delta P$$

where ΔP is the difference between the static and the producing bottom-hole pressure.

In the West Cement area, Stephens Petroleum Co. operates the gas dehydration (left, ethylene glycol type) and compressor plants. The latter picks up gas from low-pressure wells. The higher-pressure Medrano and Marchand gas passes directly through the dehydrator to a large line to Oklahoma City



This large tank battery, outdoor field pipe-line pumping unit, and Kobe hydraulic pumping installation (in right-hand building) serve a 4-well, 160-acre lease on the Medrano oil belt in the West Cement field. This production, with as much as 175 ft. of net sand, has an allowable of 300 bbl. per well per day

Ultimate recovery, by internal or gas depletion:

$$\frac{(1.0 - 0.7^*)\ (15.2 \times 77.6)}{1.25} \times 127 \text{ ft.}$$

$$= 36{,}000 \text{ bbl. per acre}$$

where 0.7* would be a final depletion pore saturation of 70 per cent.

Ultimate recovery, in event of complete water drive:

$$\left(\frac{1.0 - 0.25}{1.25} - 0.20\right)(15.2 \times 77.6)\ 127 \text{ ft.}$$

$$= 60{,}000 \text{ bbl. per acre}$$

The first wells completed in the Medrano sand were large gas wells—having an open flow of as much as 200 million cubic feet per day. Having obtained several such large gas wells, a very sizable gas reserve was evident, and a gathering system, dehydration plant, and a trunk gas line to Oklahoma City were installed to market the gas. The gas-producing operations had settled to a routine basis for 2 years or so when Stephens Petroleum Co., Inc., drilled 1 Pierson in 35-6n-10w, lower down the flank, and found prolific oil production at a depth deeper than theretofore drilled in the sector.

With some further oil-well completions down on the flank, it appeared this lower "oil belt" might in fact also be in the Medrano sand reservoir. Pressure tests were made cooperatively by the U. S. Bureau of Mines and the State of Oklahoma, and later, with still more flank oil wells obtained, it became evident the structurally high area was a free gas cap in the sand wedge above the oil belt.

The gas-cap production was reduced back to a smaller and fixed rate, and high gas-oil ratio oil wells later prorated to a limiting gas volume. Present oil-producing summary is:

MEDRANO OIL RESERVOIR PRODUCTION DATA

No. of wells	Daily average pipe-line runs	Cum. prod. to Jan. 1, 1946
32	7,325	5,197,194

The oil-well spacing has been one well to 40 acres. Two deep tests disclosed the Medrano to be water bearing further downdip. Bottom-hole-pressure surveys have indicated relatively little water influx from this source, however. The total pressure decline has been about 800 psi. Currently, only seven or eight of the wells continue to flow. Studies are being made as to unitization of the reservoir, and of the possibilities of injection operation.

Marchand sand belt.—This also is a thick (to 300 ft.) flank sand deposit, located on the south side of the east dome, and lying in the 6,500-7,200-ft. depth range. While no free gas cap is present, the reservoir produces crude which has a wide spread in gravity. Spacing is one well to 40 acres. The higher-gravity wells have an allowable of 300 bbl. per day, the lower gravity ones, 175. For the latter, the oil is 15° to 18° A.P.I. and handling it on the surface is a difficult gathering, storage, and pipe-line pumping operation. Altogether, in the Marchand sector there now are 24 of these wells.

References

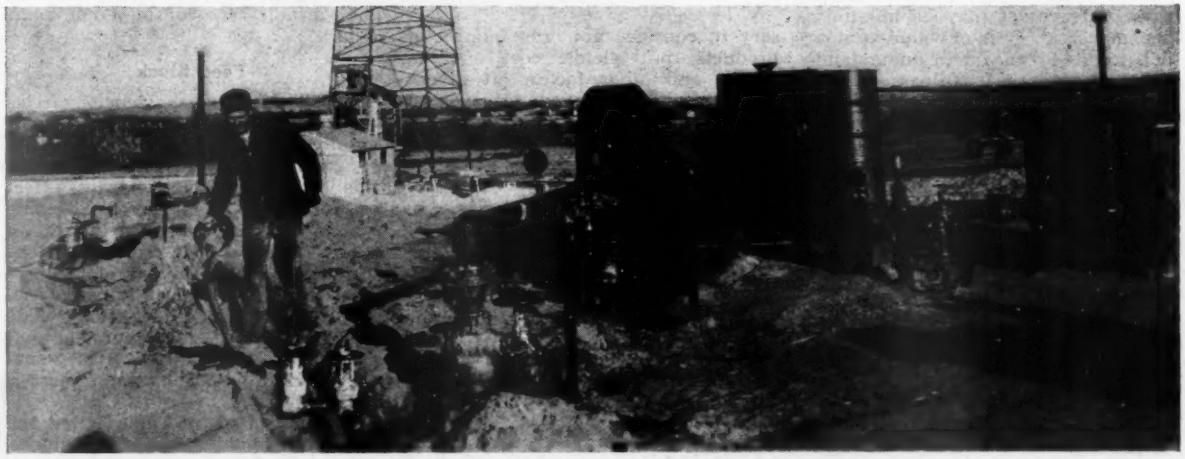
"Cement Field Data and Well Logs of West Central Oklahoma," The Oil and Gas Journal, Sept. 4, 1941, pp. 50-51.

"Complex Structure of Cement Field Poses Many Problems," by Robert Ingram, The Oil and Gas Journal, July 10, 1941, p. 23.

"Big Townsite Well Revives Cement Field," by Dal Dalrymple, The Oil and Gas Journal, Nov. 30, 1939, p. 15.

"Cement Field in Comeback with New Operations in Two Districts," by Dal Dalrymple, The Oil and Gas Journal, Mar. 3, 1938, p. 22.

One of the most unusual new completions at Cement is this Marchand sand well on the south flank of the East Cement field. Penetrating over 300 ft. of sand between 6,852-7,238 ft., it pumped 300 bbl. per day of 15° gravity oil, which is practically gas free. The crude, virtually heavy fuel-oil "as is," is so "stiff" it can hardly be poured from a container



2. Factors Affecting Quality of Motor Gasoline From Catalytic Cracking of Gas Oils

by George Armistead, Jr

THE generally high quality level of both cracked motor gasoline and the cycle oil product is a well-established and principal advantage of catalytic cracking. Some important differences in quality result, however, from variation in feed stocks, operating conditions and other factors which, in turn, define the value of feed stocks for catalytic cracking and the desirable operating conditions. It is of interest to consider some of the factors which affect the characteristics, or quality, of catalytically cracked motor gasoline and the direction and relative magnitude of the effects.

The processes of commercial importance for catalytic cracking of gas oil, comprise the Houdry, Fluid, Thermofor, and Cycloversion and have been described numerous times in the literature.[1,4,11,12,13] These processes can and do employ substantially different conditions of temperature, space rate, pressure and other variables, as well as several different catalysts. All of the processes exhibit certain common basic trends with regard to product quality, even though the correlation of absolute values may be indefinite in many cases. It is of value to note such trends as an aid to understanding the scope of usefulness of catalytic cracking. Catalytic cracking is a relatively new art which has been preoccupied with the manufacture of aviation fuels and synthetic-rubber feed stocks for several of the early years of its development, as has been pointed out for one process by Murphree et al.[4] There are, so far as is known, no generally applicable quantitative correlations on this subject. It should be understood that the figures and data discussed herein are mainly qualitative and are intended to define trends rather than to give absolute values. In fully appraising the economics of any catalytic-cracking operations, it is, of course, necessary to consider not only quality of products, but yields, cost of feed stocks, and other factors. It is not attempted herein to cover this broad subject, but only the quality of motor gasoline when operating for this stock as a prime product.

FACTORS which materially affect the qualities of motor fuels made by catalytic-cracking processes include boiling range, U.O.P. characterization factor, aniline number, and sulfur content; also catalyst activity, reactor temperature, recycle ratio, and conversion, as well as the inherent character of the catalyst used. Under generally similar conditions A.S.T.M. octane ratings may vary from 79 to 82, depending on the charge stock properties; research ratings of the same products may vary from 89 to 94.5. Paraffinic stocks show lower-octane-number motor fuels than do more naphthenic stocks. Sulfur in catalytically cracked stocks affects lead susceptibility most importantly.

A biographical sketch of the author of this series was published on page 39 of last week's Journal.

TABLE 1

Feed stock:	
Boiling range—A.S.T.M., 50%	500 to 1,100
U.O.P. "K"	11.0 to 12.0
Aniline No.	100 to 240
Sulfur, wt. %	.15 to 2.5
Operating conditions:	
Conversion, %	35 to 80
Reactor temp., °F.	900 to 1,050
Recycle ratio	0 to 1.0
Catalyst activity	Various
Catalyst character	Synthetic silica alumina; natural (acid treated bentonite); bauxite

The range of operating conditions and feed stocks which have been considered in this study, in the various processes are as shown in Table 1. Because of differences between Cycloversion and the other processes, the following discussion will apply to the former only when so stated.

Table 2 summarizes the various factors affecting the quality of catalytic-cracked motor gasoline and indicates the direction of their effects. Referring to this tabulation, it will be noted that qualities are tabulated on the left, and under the several other vertical columns are shown the effect of numerical increases in the respective variables. The variables are classified as feed stock character, operating conditions, and catalyst character. Thus, for example, under "A.S.T.M. 50 per cent point" is shown "decrease" opposite the quality "octane C.F.R.-M." This indicates that with increase in A.S.T.M. 50 per cent point there is generally a decrease in C.F.R.-M. octane. This tabulation shows in a general way the direction and magnitude of effect of the different variables. It should be noted that in several instances, including a number of those where the effect of a variable is designated as "small" the available data does not show the trend clearly, and there may be conflicting data and opinion regarding it. The attempt is made herein to outline the present general knowledge, as applying to all of the catalytic-cracking processes. In the following the variables are considered in some detail.

Feed Stock

Considering first the general effects of feed-stock character, the motor-gasoline octane number is the quality of greatest interest. It is true that this variable has somewhat less effect on quality than in thermal cracking where variations between 55 and 75 C.F.R.-M. can result from variations in the feed stock "K" and other characteristics. The typical range of octane differences resulting from a wide variation in feed stock character (excluding high-sulfur stocks) at somewhat similar operating conditions, is shown in Table 3.

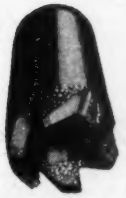
It is indicated by Table 3 that the more paraffinic low-sulfur feed stocks,

REED "BR" *Wire Line* CORE DRILLS

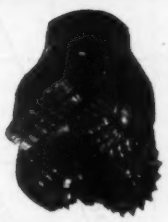
. . . are especially adaptable for directional drilling. Also allow the use of large surveying equipment which can be run on the "BR" Wire Line. Leading well surveying equipment manufacturers and directional drilling tool manufacturers have tools already designed to work in conjunction with Reed equipment.

In regular drilling and coring operations many exclusive advantages, such as the protrusion regulator spring and the replaceable core barrel cutter head, assure high drilling efficiency and higher percentage of core recovery.

2, 3, OR 4 BLADE FISH-TAIL TYPE BITS FOR THE SOFT FORMATIONS



REPLACEABLE CORE BARREL CUTTER HEAD ASSURES HIGH CORE RECOVERY



ROCK CUTTER TYPE BITS FOR HARD FORMATIONS

REED ROLLER BIT COMPANY

P. O. BOX 2119 • HOUSTON, TEXAS

EFFECT ON QUALITY OF NUMERICAL INCREASE IN VARIABLES LISTED BELOW																
QUALITY	FEED STOCK				OPERATING CONDITIONS										CATALYST CHARACTER	
	A.S.T.M. 50 PER CENT PT (4)	U.O.P. "K" (5)	ANILINE NO	PERCENT SULFUR	PERCENT CONV (3)	REACTOR TEMP	SPACE RATE (1)	RESIDUAL COKE ON CAT	CAT/OIL RATIO (2)	RECYCLE RATIO	STEAM/OIL RATIO	PRESSURE	E.P. OF GASO.	CATALYST ACTIV	SYN.	NAT.
OCTANE C.F.R.-M.	Decr	Decr	Decr	Decr (7)	Incr (6)	Incr	Small	Small	Small	Incr	Small	Small	Decr	Small	Higher	Lower
OCTANE C.F.R.-R.	Decr	Decr	Decr	Decr (7)	Incr (6)	Incr	Small	Small	Small	Incr	Small	Small	Decr	Small	Higher	Lower
TEL SUSCEPTIBILITY	Small	Decr	Small	Decr	Incr (6)	Decr	Small	Small	Small	Small	Small	Small	Decr	Incr	Higher	Lower
VOLATILITY	Decr	Decr	Small	None	Incr	Incr	Small	Small	Small	Decr (7)	Small	Small	Decr	Small	Higher	Lower
OLEFIN CONTENT	Incr	Incr	Incr	None	Decr	Incr	Small	Small	Small	Incr	Incr	Decr	Decr	Decr	Lower	Higher
AROMATIC CONTENT	Decr	Decr	Decr	None	Incr	Incr	Incr	Small	Small	Decr	None	Small	Incr	Decr	Higher	Lower
SULFUR	Incr	Decr	Small	Incr	Small	Small	None	None	None	Small	None	None	Incr	Small	Small	Small

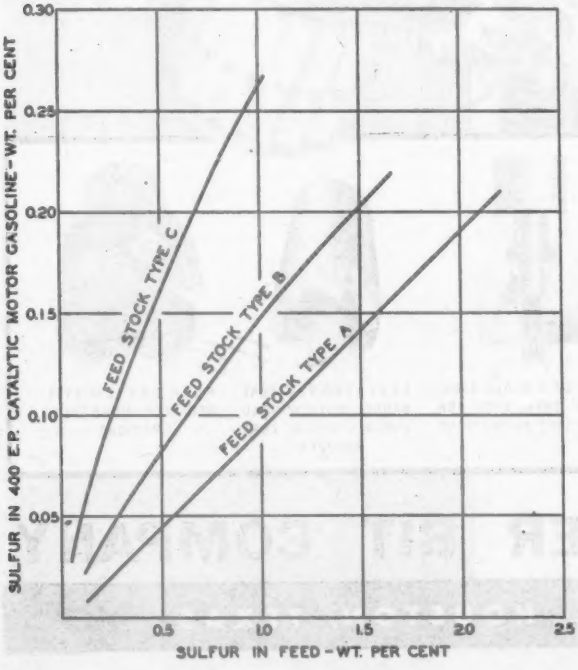
(1) Effect at constant conversion and temperature. Decreasing space rate with increasing temperature to hold conversion gives increased unsaturation and other effects of increased temperature alone. (2) Effect at constant conversion and temperature. Decreasing cat-oil or increasing cycle time in static-bed processes with temperature raised to hold conversion gives increased unsaturation and other effects of increased temperature alone. (3) 100 — Vol. % of 400 + cycle oil. (4) At constant U.O.P. "K." (5) At constant boiling range. (6) No effect in recycling operation. (7) Variable, sometimes no appreciable decrease.

Table 2—Factors affecting quality of catalytic-cracked motor gasoline

TABLE 3

Feed stock:	Mid-Cont. red. cr.	E. Tex. red. cr.	Coastal wide cut	Coastal light	Light paraffinic	Light California
°A.P.I.	21.2	25.5	22.1	24.5	32.7	32.0
I.b.p.	693	480	440	418	478	380
50 per cent	1,006	766	781	550	597	562
End point	....	....	....	736	....	840
Aniline No.	220	....	180	129	173	150
U.O.P. "K"	12.0	11.9	11.5	11.0	11.8	11.5
Sulfur, wt. per cent	.46	.40	.63	.13	.30	.59
Operating conditions:						
Conversion, per cent	59.8	57.0	48.6	55.3	55.0	64.9
Avg. reactor temp.	860	980	920	816	850	819
Catalyst character	Nat.	Nat.	Syn.	Syn.	Syn.	Syn.
10-lb. 400 end point gasoline:						
Octane C.F.R.-M. clear	79.1	79.1	80.5	82.0	82.0	80.2
Octane C.F.R.-R. clear	88.7	93.8	94.3	91.2	....	89.0
Process	T.C.C.	Fluid	Fluid	T.C.C.	Fluid	T.C.C.
Reference	8, 9	6	5	9	9	9

as characterized by U.O.P. "K" and aniline number, give generally lower-octane motor gasoline by both C.F.R.-M. and C.F.R.-R. methods. The octane advantage of the more naphthenic feed stocks was noted by Murphree et al[4] and by Simpson et al,[5] and is illustrated in Table 2 of the latter and the tabulation of typical Houdry motor gasoline qualities shown by Smith and Bland.[1] Normally the relation between octane numbers of gasolines from naphthenic and paraffinic feed stocks are of about the order illustrated by Table 3, and it should be noted, incidentally, that the



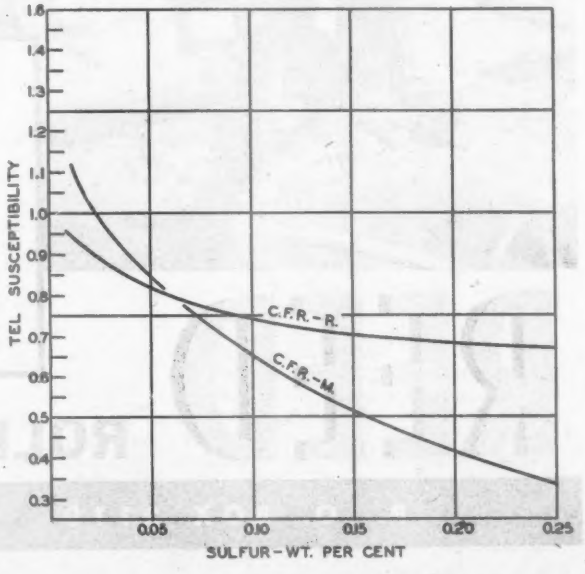


Fig. 2-1—(Left) Relation of sulfur contents of catalytic feed and catalytic-cracked motor gasoline. Fig. 2-2—(Below) Trend of TEL susceptibility with sulfur content of motor gasoline

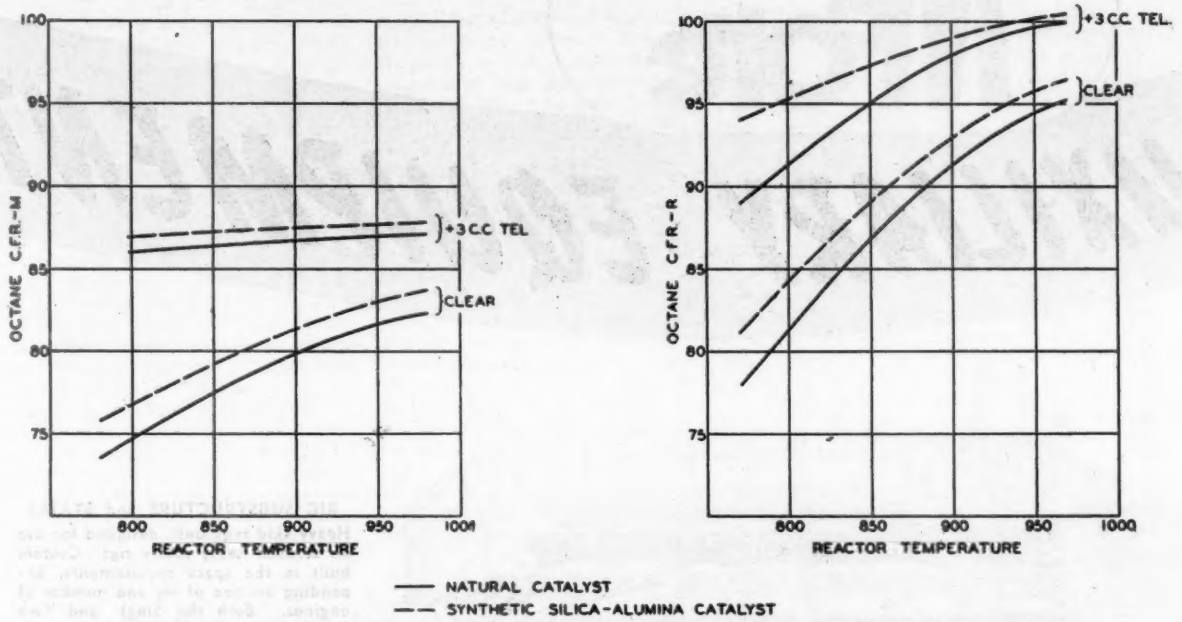


Fig. 2-3—Trend of clear and leaded octane numbers of catalytic-cracked motor gasolines with temperature

high temperatures employed in two of the Fluid runs are to a large extent responsible for the high C.F.R.-R. values shown and these two runs are not fully comparative with the remaining low-temperature runs. The effect of boiling range is less positive than characterization factor, but it is pointed out by Thomas et al[8] and Murphree et al[9] that the heavier feed stocks under the same cracking conditions give products generally more unsaturated. Increased unsaturation in turn tends toward higher C.F.R.-R. octane numbers and reduced lead susceptibility. It is generally true that the heavier stocks are less refractory and require less severe conditions for cracking which, in itself may result in lower octanes if lower cracking temperatures are involved. The aggregate effect in general is decreased C.F.R.-M. and C.F.R.-R. octanes with small effect on susceptibility as boiling range increases.

Sulfur

Another important feed-stock characteristic is its sulfur content, which largely controls the sulfur in the motor gasoline with the consequent effect on clear octane and the lead susceptibility. Fig. 2-1 is illustrative of the trend of sulfur content of motor gasoline in relation to sulfur content of the feed stock. The figure includes data from all of the processes considered herein and over a considerable range of operating conditions. It will be noted that three separate lines are shown in this figure, representing different types or ranges of feed-stock behavior. The lower line "A" is representative of full-boiling-range feed stocks which generally include West Texas and other stocks of the Gulf Coast-Mid-Continent area. The upper line "C" is more representative of certain of the California stocks. Intermediate line "B" indicates a sulfur effect between the two extremes. It will be noted that the three lines portray a substantial difference in desulfurizing action in catalytic cracking. One type of feed stock produces a cracked gasoline having less than half the sulfur content of that from another feed having the same initial sulfur. The lines in Fig. 2-1 do not necessarily show the precise values for any given feed stock, but the area between lines "A" and "C" define generally the range of variation which apply to the individual stocks as has been noted.

Fig. 2-1 does not take into consideration any variables such as boiling range of feed, operating conditions, and other factors which undoubtedly affect sulfur in the cracked motor gasoline appreciably. There is indication, for example, that high-boiling-range feed stocks crack to higher-sulfur-content gasoline than lower-boiling feed stocks of the same sulfur. The mercaptan sulfur in catalytic-cracked gasolines is low, compared to thermal-cracked gasolines.

The importance of sulfur content in itself, with regard to the prevailing 0.25 per cent maximum specification, is controlled by the quantity and sulfur content of other stocks available for blending in finished motor fuel. It is generally recognized that any necessary reduction in sulfur in catalytically cracked motor gasoline to meet specifications or improve octane qualities, can be effected by a relatively light acid treating, with, however, the usual losses resulting from such an operation.

Sulfur in catalytically cracked motor gasoline affects both clear octane of motor gasoline and lead susceptibility the more important effect being on the latter. The effect on clear octane, both C.F.R.-M. and C.F.R.-R. varies considerably with the character of feed stocks. There is a tendency for sulfur increase to lower the clear octanes, which is discernible after acid treating to remove or reduce the sulfur. The magnitude of this effect is in the neighborhood of 4-6 points C.F.R.-M. for an increase in sulfur from 0.05 to 0.25 per cent. On the other hand, some catalytically cracked gasoline in the range of 0.10 to 0.20 per cent sulfur show very little increase in clear C.F.R.-M. octane number when acid treated to remove substantially all the sulfur, although the lead susceptibility is greatly improved.

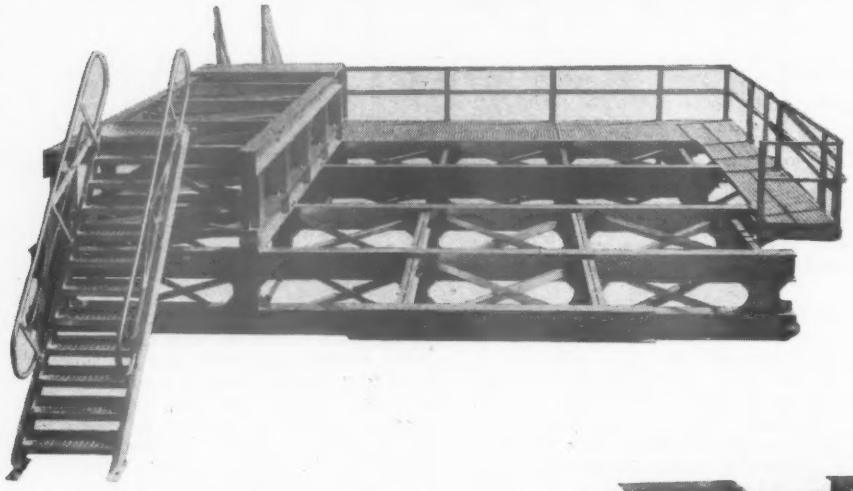
Fig. 2-2 illustrates an example of the trend of the effect of varying sulfur content on the C.F.R.-M. and C.F.R.-R. octane lead susceptibility by the Hebl, Rendel & Garton method for gasolines produced under comparable conditions. It is notable that the C.F.R.-R. susceptibility is less affected by sulfur than the C.F.R.-M. susceptibility. Susceptibility is also affected by type of sulfur compounds present in the feed stock and motor gasoline, but the magnitude of such effect is not discernible from data at hand. The susceptibilities of the high-sulfur gasolines are, of course, improved by acid treating or other desulfurization.

Catalyst

Catalyst type and activity are factors of major importance with regard to motor-gasoline quality. In general, the synthetic silica-alumina catalysts produce less carbon and more saturated products with higher content of isoparaffin and aromatics than the natural-type catalysts under comparable conditions. Simpson et al[10] stated that a substantial yield and

Moore

AUXILIARY EQUIPMENT

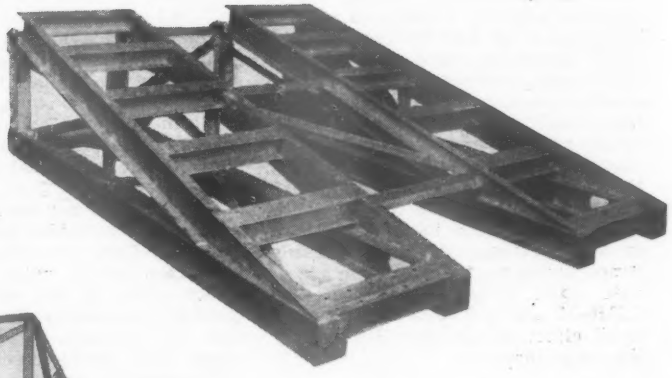


RIG SUBSTRUCTURE and STAIRS

Heavy skid type unit, designed for use on modern heavy rotary rigs. Custom built to the space requirements, depending on size of rig and number of engines. Both the Single and Two level types are made in various heights to suit the height of derrick substructures. Individual pairs of skids are kept under 8' width.

TRUCK RAMP

A double skid unit of heavy welded construction. Available in single units 4', 5', and 6' high; in double combinations of two 4', two 6' or a 4' and 6'. Carriage bolts are furnished for attaching deck timbers.



ADJUSTABLE RIG SUBSTRUCTURES

Applicable to practically all draw works and powers. Standard height 8'4". Available in Single Short Units, Single Long Units and Double Units with various length adjustments. Height may be increased by use of Draw Works and Power Substructure Supports. Extra heavy floor brackets with either hand rail or house framing are available.

quality increase of motor gasoline was obtainable with bead catalyst compared to clay. Anderson and Sterba[12] indicate comparative C.F.R.-M. clear octanes of 80.3, 79.1, and 82.1 for natural, silica-magnesia and silica-alumina catalysts respectively, with corresponding C.F.R.-R. octanes of 90.8, 89.0 and 93.0 respectively. Data on a number of stocks, shown in Fig. 2-3, show substantially higher clear octanes by both C.F.R.-M. and C.F.R.-R. for the synthetic silica-alumina catalyst product of the order of 1.5 point C.F.R.-M. and 1.5-2.5 C.F.R.-R. under similar conditions. The TEL susceptibility is somewhat greater for the synthetic catalyst gasoline. The improved octane characteristics of the silica-alumina catalyst product are one of the important factors in its competition with natural catalyst. Synthetic catalyst tends to increase the volatility of the gasoline, giving about 5-8 per cent more off at 158° and 212°, due mainly to the increased production of C_3 and C_4 hydrocarbons.

The activity of catalyst after prolonged use, when its large amount of initial surface has been reduced, may have an appreciable effect on quality of motor gasoline. One effect which has been noted on higher-sulfur feed stocks is decreased breakdown of sulfur compounds into hydrogen sulfide with consequent increase in sulfur in gasoline and reduced TEL susceptibility. The magnitude of the effect is shown, for example, in an instance where sulfur in the motor gasoline rose from 0.1 to 0.2 weight per cent as a result of a decline of about 10 points in activity rating. The motor gasoline from the Cycloversion operation with bauxite catalyst is highly unsaturated, Schulze and Helmars[1] reporting bromine numbers from 80 to 126, which compare to bromine numbers of the order of 25 to 80 by the other processes. The increase in both octane numbers with increased temperature and conversion, and the decrease in unsaturation with increased conversion in the Cycloversion process is also indicated to be similar to the trends with the silica alumina catalysts.

Operating Conditions

Operating conditions have considerable effect on the quality of the liquid products from catalytic cracking and in general more severe conditions tend to produce a higher-quality motor gasoline and a more aromatic cycle oil fraction. There are definite limitations to the use of high temperatures and conversion for the purpose of improving quality, however, because of the higher amounts of gas and carbon formed, and the consequently lowered liquid recovery.

The effect of conversion (defined as 100 per cent minus 400 plus cycle oil yield), and the other operating conditions on product quality has been discussed in some detail by Murphree et al[5] and Schulze and Helmars for the Cycloversion process.[1] The principal effect of increased conversion on quality is to increase saturation of all products and to raise the aromatic content of the gasoline and gas-oil fractions. The magnitude of this effect is controlled to some degree by the conditions used to increase conversion, i.e., increased temperature tends to add olefinic content while lower space rate or increased catalyst-oil ratio at constant temperature tend to decrease olefins. The data indicate rather substantial increases in both C.F.R.-M. and C.F.R.-R. octanes with increased conversion in single pass at constant temperature, of the order of approximately 1-2 points on both scales for an increase from 55 to 65 per cent conversion. TEL response is such, however, that the leaded octanes (3 cc.) are of the order of only about 0.5 point higher for the material produced at higher conversion. In recycling operations there is no material change in octane with change in conversion. Conversion increases on the silica-alumina catalysts raises the volatility of the 400 e.p. motor gasoline a comparatively small amount, for example, in the order of 5° maximum increase in per cent off at 158° F. when going from 60-80 per cent conversion, with a decreasing effect in the upper distillation ranges. This effect is not reported for the Cycloversion operation,[1] however, between two extremes of conversion described by Schulze and Helmars.

The effect of reactor temperature at constant conversion on gasoline quality is to increase unsaturation and to increase both C.F.R.-M. and C.F.R.-R. octanes. This was illustrated by Murphree et al[5] with regard to C.F.R.-R. octanes. Fig. 2-3 is a similar illustration showing the trend of C.F.R.-M. and C.F.R.-R. clear and leaded octanes with temperature. This figure, based on paraffinic gas-oil feeds at comparable conversion on silica-alumina catalyst, indicates several noteworthy features of the effect of temperature and octane relationships generally. The increase of C.F.R.-R. clear octane number with temperature is rapid, and the leaded octane numbers increase similarly. The effect of temperature on motor octane is much less, however, and particularly so on the leaded motor octane which is practically constant, regardless of temperature. It is evident that synthetic catalyst gives substantial improvement in octane number under comparable conditions as was noted before. The decreased lead response at high temperatures is noteworthy, indicating that high temperature is useful as a quality improver mainly for raising C.F.R.-R. leaded quality, since it has no important effect on the leaded C.F.R.-M. quality.

The data in Fig. 2-3 are not intended to include Cycloversion operations on bauxite catalyst, although behavior with respect to temperature seems to be in generally the same direction. The general import of Fig. 2-3 is that temperature increase through the lower range below 900° gives an increase of several points in leaded C.F.R.-R. octane with only a small increase C.F.R.-M. and as temperature increases above this range, the small octane improvement possible is much more difficult to justify because of the increasing gas production under such conditions. The effect of increased unsaturation at higher temperatures is also reflected in the available C_3 and C_4 unsaturates available for polymerization.

Recycling is employed as a means of increasing ultimate yield of motor gasoline from a limited feed-stock supply when adequate capacity is available in the catalytic-cracking unit. It was pointed out by Thomas[3] that recycling is usually accompanied by increases in octanes of aviation gasoline. This is generally borne out in motor gasoline operations, the clear octane increase being of the order of one to two octanes C.F.R.-M. and C.F.R.-R. for recycle ratios 0.25 to 0.50 (ratio of recycle to fresh in total feed).

References

1. W. A. Schulze and C. J. Helmars, "Gas Oil Cracking by the Cycloversion Process," The Oil and Gas Journal, Apr. 13, 1944, p. 225.
2. C. L. Thomas, N. K. Andersen, H. A. Becker and J. McAfee, "Cracking With Catalysts," Proceedings of twenty-fourth annual meeting of A.P.I., Nov. 8, 1943, Section 3, p. 83.
3. E. V. Murphree, C. L. Brown, E. J. Gohr, C. E. Jahnig, H. L. Martin and C. W. Tyson, "Improved Fluid Process for Catalytic Cracking," Transactions A.I.Ch.E., Feb. 25, 1945, Section A, p. 19.
4. E. V. Murphree, C. L. Brown, H. G. M. Fischer, E. J. Gohr and W. J. Sweeney, "Fluid Catalyst Process," Ind. & Eng. Chem., July 1943, p. 768.
5. E. V. Murphree, H. G. M. Fischer, E. J. Gohr, W. J. Sweeney, and C. L. Brown, "Fluid Catalyst Cracking for Premium Fuels," Proceedings twenty-fourth annual meeting of A.P.I., Nov. 8, 1943, Section 3, p. 91.
6. G. H. Mateer and J. D. Haney, "Three Fluid Catalytic-Cracking Units Form the Heart of New Refinery," The Oil and Gas Journal, July 8, 1944, p. 87.
7. E. A. Smith and R. E. Bland, "Properties of Typical Products Refined by Houdry Cracking Process," The Oil and Gas Journal, Apr. 12, 1944, p. 209.
8. T. P. Simpson, "T.C.C. Announces Liquid Processing Using Pelleted Clay or Beaded Catalyst," The Oil and Gas Journal, May 12, 1945, p. 88.
9. Private communication.
10. T. P. Simpson, L. P. Evans, C. V. Hornberg, and J. W. Payne, "Recent Development in T.C.C. Processing," Proceedings of twenty-fourth annual meeting of A.P.I., Nov. 8, 1943, Section 3, p. 83.
11. E. Houdry, W. R. Burt, A. E. Pew, Jr., and M. A. Peters, Jr., "The Houdry Process," The Oil and Gas Journal, Nov. 24, 1938, p. 40.
12. N. K. Anderson and M. J. Sterba, "Small-Scale Fluid-Type Catalytic Unit Designed," Petroleum Refiner, Dec. 1945, p. 497.
13. T. P. Simpson, L. P. Evans, C. V. Hornberg and J. M. Payne, "The Thermofor Catalytic-Cracking Process," Proceedings of twenty-third annual meeting of A.P.I., Nov. 9, 1942, Section 3, p. 59.
14. D. B. Ardern, R. H. Newton, and G. L. Barcus, "Catalytic Cracking of Cuts from Coastal Crude," Ind. & Eng. Chem., June 1945, p. 546.
15. J. R. Bates, S. S. Kurtz, F. W. Rose, Jr., and I. W. Mills, "Composition of Catalytically Cracked Gasolines," Ind. & Eng. Chem., Feb. 1942, p. 147.

● Protect Your Pumping Equipment
● Keep Your Wells Operating with

With Century oil field motors, you get double protection. The splash-proof design means your motors are "weather-protected" against snow, rain, sleet, and ice.

Because they are designed to provide high torque and high slip, Century type SCT pumping unit motors save wear and tear on equipment. They cushion the impact of the peak load and reduce the sudden shock. These motors are designed for high slip, which means that the motor speed pulls down as the load comes on. As the load peak is passed the motor speeds up — storing energy in the fly wheel for the next cycle of operation.

For complete information on these widely accepted Century motors and generators, see your nearest supply store, or call in your nearest Century sales engineer.

Where public service current is not available, Century type ARC generators will provide you with a dependable and economical source of electric power. Depending on the load per motor and the size of generator, from 10 to 30 wells can be pumped from one generator.

CENTURY ELECTRIC COMPANY

1806 Pine Street
St. Louis 3, Mo.

Offices and Stock Points in Principal Cities

Century C MOTORS

464

QUESTIONS on TECHNOLOGY

by W. L. Nelson
Consulting Engineer

Equivalent Diameter Of Annuli

In your Petroleum Refinery Engineering you state that the equivalent diameter is equal to 4 times the hydraulic radius but that the radius should be figured on the heated perimeter of the passageway. I am told that recent experiments do not show this.—A.F.C.

Inasmuch as heat transfer is a function of the turbulence at the surface through which heat is being transferred, it is logical to base the equivalent diameter on the heated perimeter rather than the perimeter which includes shell surface, baffles, rods, etc. However, recent work, notably that of Gunter and Shaw on fintube double-pipe exchangers (Heat Transfer, Pressure Drop, and Fouling Rates of Liquids for Continuous and Noncontinuous Longitudinal Fins, Houston spring meeting A.S.M.E. March 1942) and the excellent summary by Weigand and Baker on this very subject (Transfer Processes in Annuli, Trans. A.I. Ch.E. XXXVIII, page 569, 1942) indicate that the regular hydraulic radius should be used.

Thus, the recommended method of obtaining the equivalent diameter is to multiply the hydraulic radius by 4. Hydraulic radius is defined as:

$$\frac{\text{Cross sectional area}}{\text{Perimeter of passage}}$$

The use of the "heated" perimeter rather than the entire perimeter makes some difference in equipment which has a large unheated confining area such as in a double-pipe exchanger but for bundles of tubes and situations in which the heating surface constitutes almost the entire perimeter, it makes little difference which kind of hydraulic radius is used. For passageways the surfaces of which exhibit parallelism, such as two concentric pipes or a box within a larger box, four times the hydraulic radius (i.e. the equivalent diameter) becomes merely the difference in the diameters of the two confining passageways or $(d_2 - d_1)$. Stated in another way it is merely the distance between the confining surfaces.

In actuality, turbulence is a function of the proximity of the fluid to the surface or surfaces which confine it, and hence in complicated passageways such as that in a bundle of tubes, the equivalent diameter is some average of the distance between surfaces. In tube bundles, the predominant arrangement is the opening between adjacent tubes. For flow across a tube bundle (see Fig. 1) the average distance between surfaces is almost equal to the tube spacing. For flow parallel with the center line of the tubes, the distance can be judged by use of the hydraulic radius. If s is the inches between tubes, d is the tube diameter in inches, and h is the height of the triangle, the equivalent diameter d′ is,—see Fig. 2:

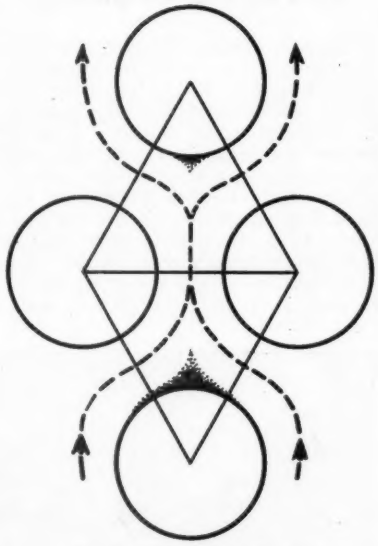


Fig. 1—Flow across tube bank

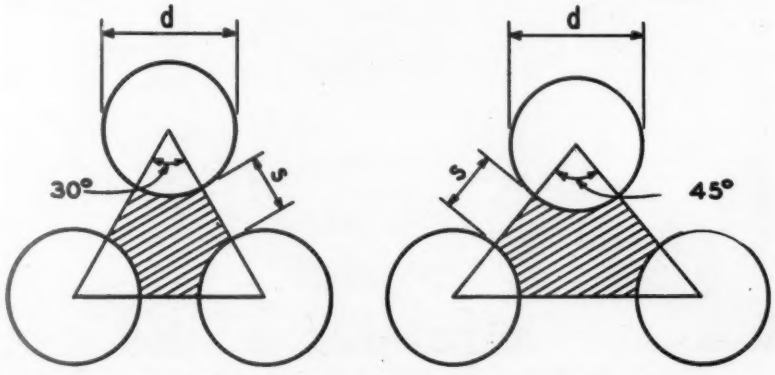


Fig. 2—Equilateral-triangle and square arrangements of tubes

For an **Equilateral triangle** arrangement

$$h = .866\,(d + s)$$

$$d' = 4\,\frac{.866\,(d+s)\cdot\dfrac{(d+s)}{2} - \frac{1}{2}\cdot\dfrac{\pi}{4}d^2}{\frac{1}{2}\pi d}$$

$$= \frac{4}{\pi} \times \frac{.866d^2 + .866ds + .866s^2 - .785d^2}{d}$$

$$= 1.27\,\frac{(.866s^2 + .866ds + .081d^2)}{d}$$

$$= 1.47\,\frac{(s^2 + ds + .0935d^2)}{d}$$

For a **Square** arrangement

$$h = .707\,(d + s)$$

$$d' = 1.8\,\frac{(s^2 + ds - .11d^2)}{d}$$

Values of the equivalent diameter (d′) have been worked out for a number of typical tube sizes and spacings in Table 1.

TABLE 1—EQUIVALENT DIAMETERS FOR FLOW PARALLEL TO THE TUBES THROUGH A BUNDLE OF TUBES

Tube size	Tube spacing	Triangle d′	Triangle d′/s	Square d′	Square d′/s
1 in.	.5	1.24	2.48	1.15	2.3
½ in.	.25	.612	2.48	.575	2.3
1½ in.	.625	1.51	2.41	1.26	2.02
1 in.	.416	1.00	2.41	.84	2.02
⅝ in.	.26	.63	2.41	.52	2.02
1 in.	.375	.89	2.38	.73	1.95
¾ in.	.282	.67	2.38	.55	1.95

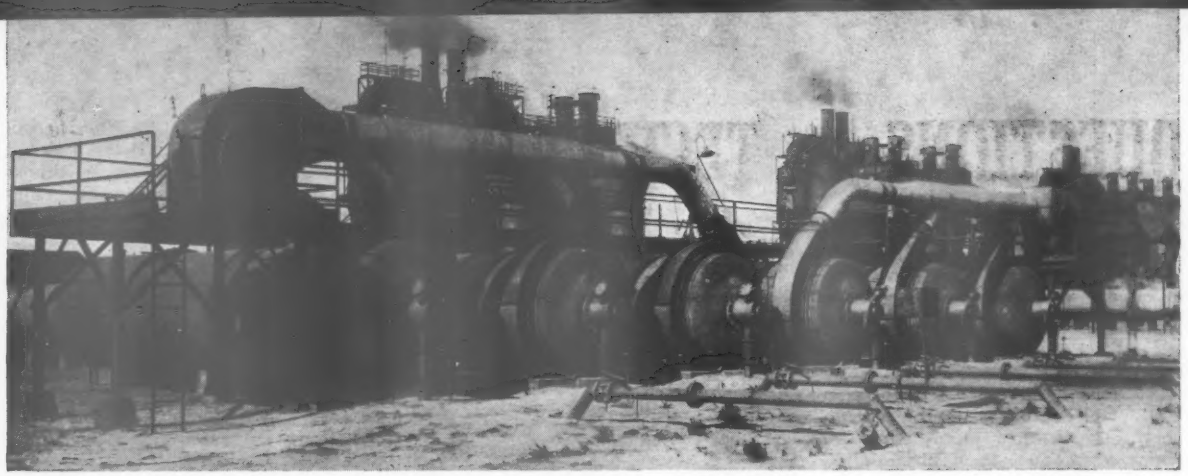
Consideration of Table 1 shows that the equivalent diameter for flow along the outside of tubes is 2 to 2.5 times the tube spacing.

For the whole tube bundle the equivalent diameter will range from a value about equal to the space between tubes for much baffled exchangers to a value of 2.5 times the tube spacing for exchangers which have no baffles (Table 2).

TABLE 2—EQUIVALENT DIAMETERS FOR EXCHANGERS

Cross baffles—	Equi. Dia.
None	2.5 s
Few	2.25 s
Normal	1.5-2.0 s
Close spacing	1.25 s

The case of infinite cross baffles was not assigned a value of one s in Table 2 because at such close spacings the effect of the baffle on turbulence would begin to be important (where the baffle spacing is nearly equal to or less than s).



Furnace plant for manufacture of carbon black

Carbon-Black Industry Strains to Meet Requirements for Rubber

by Fabian R. Staley

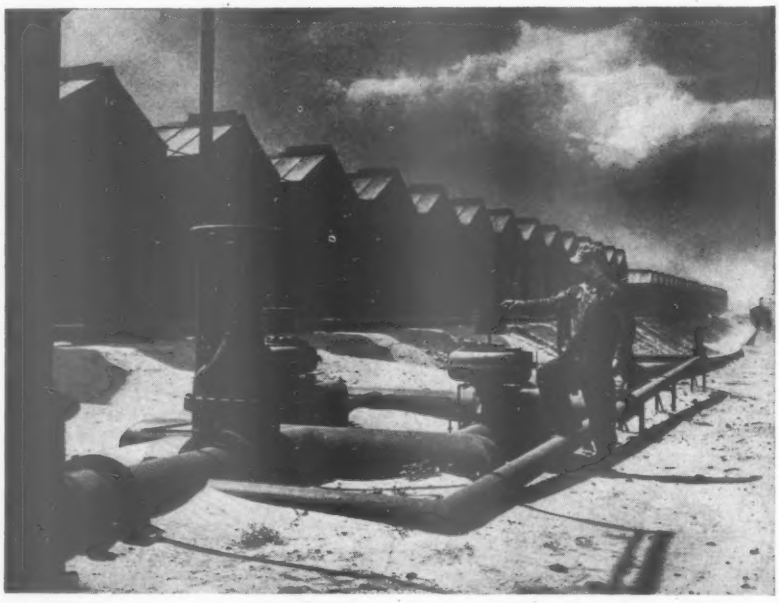
THERE have been profound changes in the carbon-black industry as a result of this war. In 1938 the production of channel and furnace black totaled 477 million pounds; the rate of production by the end of 1944 approximated a billion pounds. In 1938 almost 93 per cent of all the black was made by the channel process; in 1944 this figure had dropped to less than 50 per cent.

The use of synthetic rubber has necessitated quality changes of black. The fine particle channel black formerly required for natural rubber has given way to a much larger particle. This is to facilitate the breakdown and processing of the new rubber and to make it more resilient and cooler running. The semireinforcing furnace type with its large particle is giving way to a smaller particle to make the black more reinforcing without much sacrifice of resiliency and heat generation.

—Isaac Drogin.

THE consumption of carbon black has soared with the increased production of synthetic rubber since this type requires from 30 to 100 per cent more black than does natural when used in the manufacture of tires. Without carbon-black reinforcement synthetic rubber does not give satisfactory results; however, the effect on G.R.-S. is much more pronounced than on butyl rubber. All synthetic rubber requires black, including Neoprene (chloroprene polymer), buna-N (copolymer of butadiene and acrylonitril), butyl (copolymer of olefins and diolefins), and Thiokol (a polysulfide type of rubber). Although 90 per cent of the carbon-black production of the country is consumed in the manufacture of rubber, the printing-ink industry uses about 24.5 million pounds a year, the paint industry over 5 million pounds a year, and other industries in excess of 12 million pounds a year. Early in 1945, in spite of increased production rates over the previous year, War Production Board took emergency action to curtail consumption by reducing the allowable content in rubber by 10 per cent, and to increase the output of some active plants by permitting gas enrichment with propane and naphtha. Also an AA-1 preference rating was given on all pending projects as well as top labor priority. The emergency restrictions were canceled in June. As a result of new production facilities it is expected that the supply of carbon black will meet domestic requirements in 1946.

Since carbon black is the best known reinforcing pigment for rub-



Plant for manufacture of carbon black by the channel process

TABLE 1—CARBON BLACK PRODUCED FROM NATURAL GAS IN THE UNITED STATES IN 1944, BY STATES AND BY MAJOR PRODUCING DISTRICTS

(Bureau of Mines figures)

State and district—	Producers reporting*	No. of plants	Production			Natural gas used			
			Pounds	Value at plant		M cu. ft.	Avg. yield per M cu. ft. (lb.)	Value	
				Total	Average (cents)			Total	Average per M cu. ft. (cts.)
California	1	1							
Kansas	2	3	86,792,000	$3,474,000	4.00	16,516,000	5.26	$670,000	4.06
New Mexico	1	1							
Louisiana	7	7	†160,019,000	5,421,000	3.39	23,469,000	6.82	607,000	2.59
Oklahoma	3	3	53,887,000	1,787,000	3.32	6,416,000	8.40	227,000	3.54
Texas:									
Panhandle district	17	31	†401,556,000	14,234,000	3.54	267,323,000	1.43	3,735,000	1.40
Rest of State	4	8	†99,606,000	4,495,000	4.51	42,046,000	2.37	524,000	1.25
Total Texas	17	39	†501,162,000	$18,729,000	3.74	309,369,000	1.56	$4,259,000	1.38
Total United States	22	54	†801,860,000	$29,411,000	3.67	355,770,000	2.20	$5,763,000	1.62

*In counting the total number of producers reporting, a producer operating in more than one state, district, or county is counted but once. †Includes carbon black made from liquid hydrocarbons.

ber tires an unprecedented demand for it should exist for some time. According to Bureau of Mines estimates, an average annual consumption for all purposes of 1,140 million pounds is indicated for the 5 years succeeding the war, about 1,234 million pounds being needed in the first year and smaller amounts thereafter as more natural rubber is used. It estimates also that the productive capacity of the industry in the United States at the end of 1945 approximated 1,450 million pounds per year.

Increased use of natural rubber would require greater quantities of channel process black, while a decrease in the consumption of synthetic rubber would reduce the demand for the semireinforcing furnace-type black and tend to increase production of the higher reinforcing type. According to estimates by John L. Collyer, B. F. Goodrich Co., America's rubber needs will average 825,000 tons a year for the next 5 years. He states that after providing 200,000 to 300,000 tons of security synthetic rubber, there would be left an average of 525,000 to 625,000 tons a year where the choice of materials should be governed by competition. Special-purpose synthetic rubbers, even when higher in price, are used throughout industry where their special properties justify the higher price.

The carbon-black industry has developed and expanded only where there have been available large quantities of natural gas at a very low price. Frequently gas has been used in the plants that would otherwise have been wasted as well as gas that is unsatisfactory for pipe-line use because of its high sulfur content. Stripped and refinery gases are used also. The industry began in Pennsylvania, moved to West Virginia, and after 1916 migrated to Louisiana and to the Southwest. Since 1916 it has

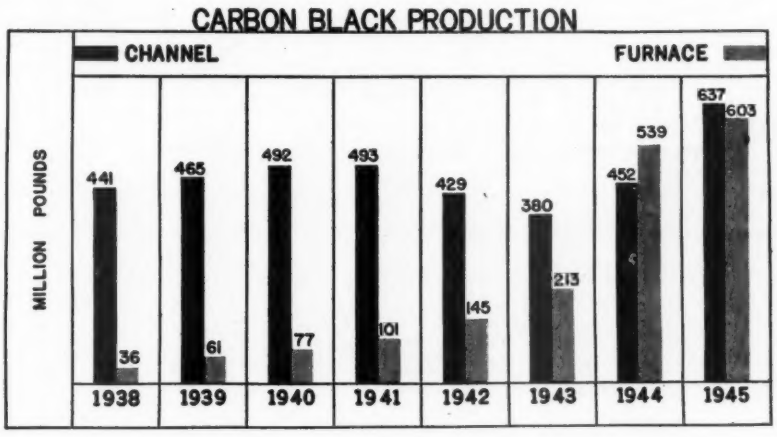


Fig. 1—The channel process has shown steady increase in use since 1938

TABLE 2—LOCATION OF CARBON BLACK PLANTS IN THE UNITED STATES

Producers—	Nearest town to plant location	Carbon black process
Columbian Carbon Co.	Hancock, La.	Furnace*
Charles Eneu Johnson & Co.	Dew Drop, La.	Channel
Imperial Oil & Gas Products Co.	Sterlington La.	Furnace†
United Carbon Co.	Swartz, La.	Channel
Godfrey L. Cabot, Inc.	Ville Platte, La.	Furnace*
Columbian Carbon Co.	Eola, La.	Furnace*
Oil & Gas Research	Lake Charles, La.	Furnace†
Columbian Carbon Co.	Conroe, Tex.	Furnace*
Columbian Carbon Co.	Fairbanks, Tex.	Furnace*
Columbian Carbon Co.	Corpus Christi, Tex.	Channel
United Carbon Co.	Aransas Pass, Tex.	Channel
United Carbon Co.	Aransas Pass, Tex.	Furnace*
Godfrey L. Cabot, Inc.	Eliasville, Tex.	Channel
United Carbon Co. (2 plants)	Midland, Tex.	Channel
Columbian Carbon Co.	Seagraves, Tex.	Channel
Columbian Carbon Co.	Seagraves, Tex.	Furnace*
Godfrey L. Cabot, Inc.	Wickett, Tex.	Channel
Godfrey L. Cabot, Inc.	Kermit, Tex.	Channel
Continental Carbn Co.	Eunice, N. M.	Channel
Columbian Carbon Co.	Eunice, N. M.	Channel
Charles Eneu Johnson & Co.	Monument, N. M.	Channel
Charles Eneu Johnson & Co.	Stonewall, Okla.	Channel
Columbian Carbon Co.	Pampa, Tex.	Channel
Columbian Carbon Co. (2 plants)	Pampa, Tex.	Channel
Columbian Carbon Co.	Pampa, Tex.	Roller
Godfrey L. Cabot, Inc.	Pampa, Tex.	Channel
Godfrey L. Cabot, Inc.	Schafer, Tex.	Channel

Producer—	Nearest town to plant location	Carbon black process
Godfrey L. Cabot, Inc.	Bowers, Tex.	Channel
General Atlas Carbon Division	Pampa, Tex.	Furnace*
Carbon Black, Inc.	Pampa, Tex.	Channel
Columbian Carbon Co. (2 plants)	Borger, Tex.	Channel
Panhandle Carbon Co.	Borger, Tex.	Channel
J. M. Huber Corp.	Borger, Tex.	Channel
J. M. Huber Corp.	Borger, Tex.	Furnace*
Phillips Petroleum Co.	Borger, Tex.	Furnace*
United Carbon Co. (4 plants)	Borger, Tex.	Channel
United Carbon Co.	Borger, Tex.	Disc (Wheel)
United Carbon Co. (3 plants)	Sanford, Tex.	Channel
United Carbon Co.	Sanford, Tex.	Roller
United Carbon Co.	Stinnett, Tex.	Channel
Godfrey L. Cabot, Inc.	Stinnett, Tex.	Channel
Columbian Carbon Co.	Sheerin, Tex.	Channel
Columbian Carbon Co.	Sunray, Tex.	Channel
United Carbon Co.	Sheerin, Tex.	Channel
United Carbon and Phillips Pet.	Sunray, Tex.	Channel
Continental Carbon Co.	Sheerin, Tex.	Channel
Continental Carbon Co.	Sheerin, Tex.	Furnace*
Crown Carbon Co.	Sheerin, Tex.	Channel
Godfrey L. Cabot, Inc.	Guymon, Okla.	Furnace*
General Atlas Carbon Division	Guymon, Okla.	Furnace*
Columbian Carbon Co.	Hickok, Kans.	Roller
United Carbon Co.	Ryus, Kans.	Furnace*
United Carbon Co.	Ryus, Kans.	Roller
Shell Chemical Co.	Shell Point, Calif.	Furnace*

*Combustion process, continuous. †Thermal decomposition, cyclic.

centered in the Texas Panhandle. It furnished the first substantial market for the gas in the Monroe field, and has been an important market for the tremendous Hugoton gas field of Kansas, Oklahoma, and Texas.

Carbon-black production by the channel and the furnace processes since 1938 is shown in Fig. 1. Production from natural gas in the United States in 1944, by states and districts, is shown in Table 1.

Continuous research is conducted by the leading manufacturers for the purpose of improving the quality of product and the efficiency of conversion, thus conserving natural gas. New processes have resulted, and new types of black have been developed which help to overcome some of the disadvantages of synthetic rubber such as its low reinforcement, low resiliency, and its tendency to overheat and crack. A combination of natural gas and oil is used as raw feed in a furnace process developed by Phillips Petroleum Co. to produce Philblack. This is a smooth processing black which has a high modulus and a low shrinkage.

Channel-black manufacture has been concentrated on the high efficiency type known as easy processing (E.P.C.) which is better suited for G.R.-S. because of its easier processing, low heat buildup, and high resiliency. In order to meet the great demand for this type of black, many changes had to be made in channel plants, including new tips and settings, and redrafting of hot houses. Gas throughput had to be reduced, and when it was necessary to strip all of the butane, propane, and pentane fractions from the gas during the war for gasoline manufacture yields from these plants fell off as much as 25 per cent.

New furnace-process blacks have been developed for synthetic rubber. The high-modulus furnace-type blacks are in wide demand. The development has been improvement in reinforcement by increasing the particle fineness. A newly developed furnace black, Sterling K., has a high tensile strength and high elongation. The search for improved types of black continues as rubber manufacturers try to obtain the best results from synthetic rubber.

Compositions of natural gas used in the Texas Panhandle district are within the following ranges:

	% by volume	
Methane	93.7	83.3
Ethane	4.7	10.4
Propane	1.2	4.8
Butane	0.3	1.3
Pentane	0.1	0.2

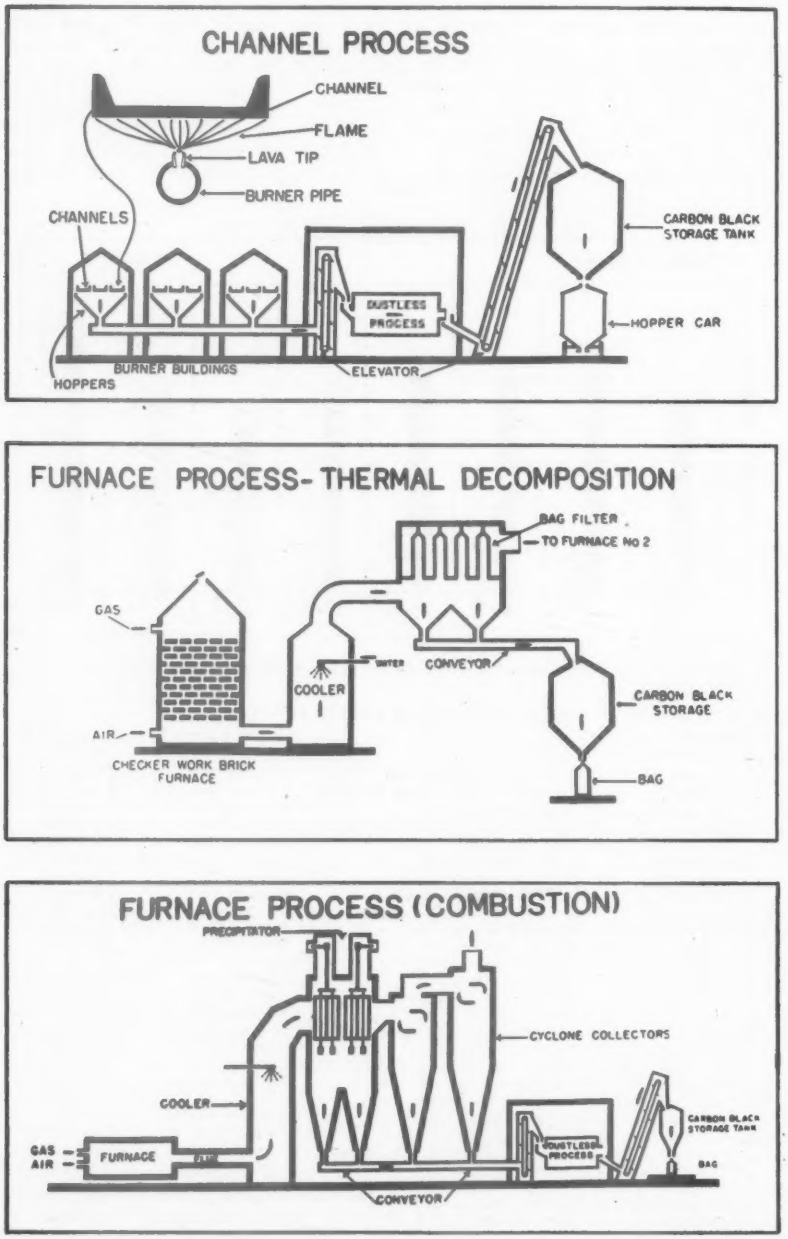


Fig. 2—Carbon-black production methods. (Courtesy United Carbon Co., Inc.)

Processes of Manufacture

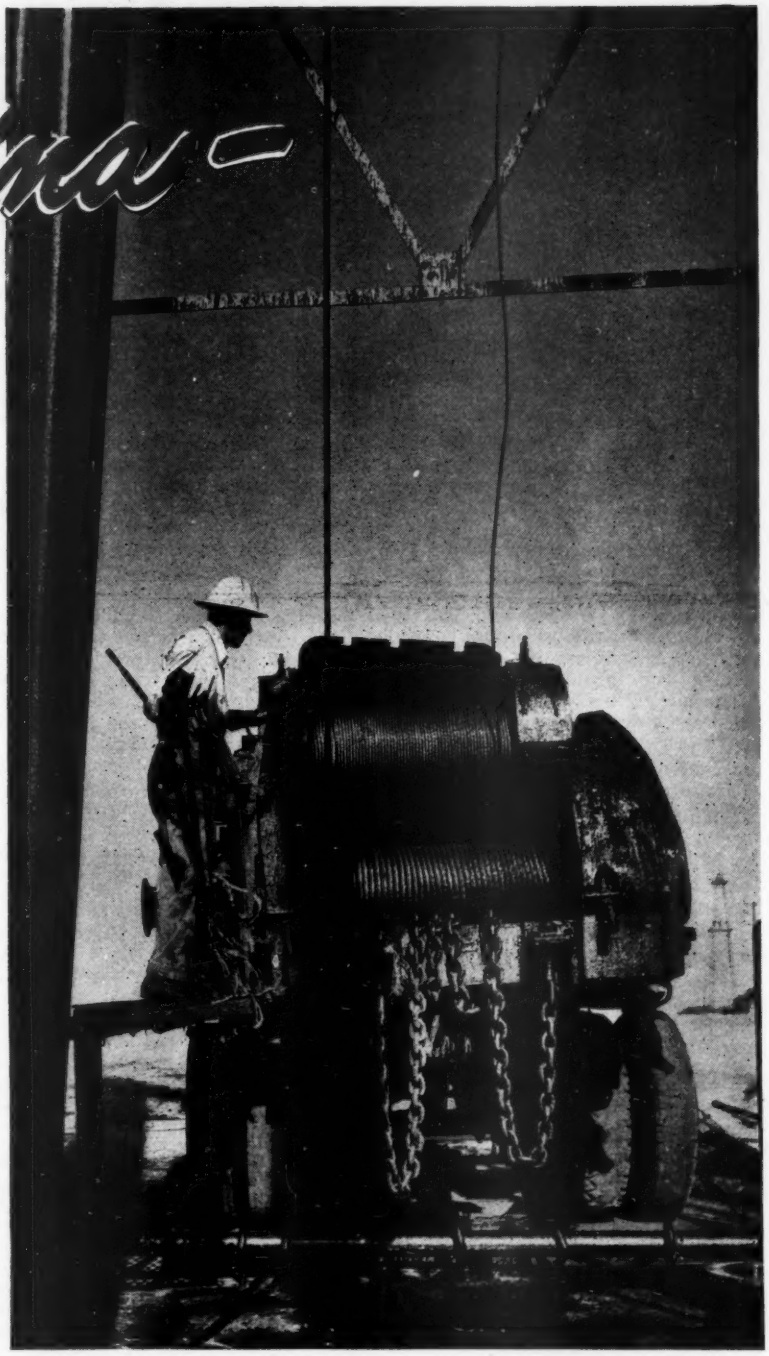
Three distinct processes are used for manufacturing carbon black, and their products are not alike in properties or in quality. Drogin describes the processes as follows:

(A) The channel process.—Fan-shaped smoky flames, produced by burning natural gas in a limited supply of air through small lava tips, are impinged upon moving iron channels on which the carbon black is deposited and from which it is later automatically scraped off.

(B) The furnace process, continuous.—Partial combustion of natural gas or other hydrocarbons is effected in specially designed furnaces, resulting in the formation of carbon black and gaseous products. After being cooled with sprays of water, the carbon black is separated from the gaseous stream by means of extremely high voltage in extensive electrical precipitator equipment, aided by a battery of cyclone collectors.

(C) The furnace process, cycle.—Natural gas is thermally decomposed in special furnaces packed with checker firebricks or refractory-walled flues under a cycle process. The bricks or flues are heated with a mixture of natural gas and air, followed by another treatment of natural gas alone. As a result of the heat, the natural gas is decomposed into carbon black and hydrogen. After being cooled with sprays of water, the carbon black is separated from the gaseous stream by a bag filter system; or

for Stamina—



—no other material can equal

ALLOY STEELS

For the tough oil country jobs where extra stamina is needed to resist severe strains, shock, reversal of stresses, wear, corrosion or abnormal temperatures, no other material can equal alloy steels.

These top-quality steels provide long, dependable life at low cost per year of service in spite of punishing operating conditions. That's one important reason why many equipment manufacturers use Republic Alloy Steels for shafts, gears and bearings in draw-works—and for slips, tongs, swivels, kellys, blocks, pumps, drill bits and other items.

Another reason for the use of these steels, particularly in deep hole drilling, is their high strength-to-weight ratio. This permits the use with safety of lighter equipment and smaller sections, and provides the means for reducing deadweight.

Add up all the advantages of alloy steels and you must agree that no other material offers so much for the money. Republic—world's leader in the production of alloy steels—is ready NOW to tell you how to use them to best advantage.

REPUBLIC STEEL CORPORATION
Alloy Steel Division • Massillon, Ohio
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Bldg., New York 17, N. Y.

Republic
ALLOY STEELS

Other Republic Products include Casing—Tub

the entire stream of gas and black is passed into a wash box where the carbon black is caught and subsequently filtered, dried, pulverized, and screened. The hydrogen may be utilized in the synthesis of ammonia, as fuel, or as a diluent of natural gas in the "make" period in order to modify the quality of the resulting black.

In the channel process natural gas is fed to the burner pipe which contains specially small lava tips; the average burner house contains 3,080 tips. A tip burns 50 to 75 cu. ft. of gas in 24 hours. When the gas is burning a luminous, fan-shaped flame is produced at right angles to the length of the channel upon which it impinges and spreads over the bottom surface. The channels are moved slowly back and forth over the burners. The black deposited by each flame is removed from the channels by fixed scrapers in the top of the hopper. The hoppers are mounted over a screw conveyor into which the black falls by gravity and is conveyed out of the house into a central conveyor system, feeding to a control point known as the packing house.

The quality and yield in the channel process depends upon:

1. The composition of the gas, sulfur content, burner distribution, and pressure of delivery to the tips.
2. Tip design, width of slot, interspacing, distance from channels, number between hoppers, and cleanliness.
3. Channels—their width, interspacing, speed of travel.
4. Feed lines to the burners—their location, diameter, and cleanliness.
5. Scrapers—their shape and close adjustment to the channels.
6. Hoppers—their size and interspacing.
7. Conveyor design.
8. Flames—their brightness, steadiness, and uniformity.
9. Hot-house temperature.
10. Draft-uniformity and intensity.
11. Smoke concentration within the house.
12. Atmospheric conditions.

Yields of rubber-grade black by the channel process range from 1.0 to 2.1 lb. per 1,000 cu. ft. of natural gas, and that of color-grade black averages less than 1.0 lb. per 1,000 cu. ft. In the Texas Panhandle where the bulk of channel black is produced the average yield of rubber-grade black is 1.32 lb. per 1,000 cu. ft. Because of their bulky condition the rubber-grade blacks are converted into pellets which have sufficient strength to permit shipment in bulk in covered hopper cars and handling at the rubber plants in bulk through closed conveyors. Pellets are formed in several ways by wet or dry processes. It is necessary to put the wet pellets through a drier after they are formed.

Furnace process — combustion.—In this process the equipment consists of a furnace (combustion chamber), a cooling tower, an electrical precipitator, and several cyclone collectors. Natural gas, wild gasoline, casinghead gas, cracking-plant gas, or tank bottoms, or a mixture of these and a limited supply of air are fed continuously into the furnace. Carbon black and gaseous byproducts are formed together with water vapor, which is a product of combustion. The maximum temperature of the furnace may range from 2,200° to 3,000° F. The hot gases carrying the carbon black in suspension are withdrawn continuously from the furnace to the cooler where they are quenched by water sprays, cooled to a temperature of about 500° F., and then passed into an electrical precipitator where the black is agglomerated. The remainder is collected to a large extent in a cyclone after the precipitator. The gases and condensable vapors are discharged through a stack at the top of the cyclone direct to the atmosphere.

Because of the flexibility of the furnace process, furnace-type carbon black is produced commercially in several ways by the partial combustion of hydrocarbon gases. The various furnaces utilized are the subject of patents, some pending.

Various types of black are produced by the furnace process. They are the semireinforcing type, the high-modulus type, the electrical-conductive type, the fine-furnace type, and the high elongation type. The yield of black from the incomplete combustion of hydrocarbon gas in a furnace ranges from 3 to 16 lb. per 1,000 cu. ft., depending upon the quality of the gas, furnace design, the grade of black, and other factors. The black is generally pelleted by either dry or wet methods, but on account of the softness of the black the pellets disintegrate when handled in bulk, and therefore all furnace black is shipped in bags.

Furnace process — thermal decomposition.—This is a cyclic process which consists of "heat" and "make" periods. First the refractory material is heated to a temperature from 2,000°-3,000° F. by flames produced from the complete combustion of natural gas. After the refractory reaches the desired temperature, the heating is discontinued and the "make" period begins. The natural gas is now brought in contact with the hot refractory, and the cracked products formed at the high temperatures are withdrawn from the furnace. The hot products are cooled with sprays of water, the carbon is removed from the gases in bag filters or in a wash box after which it is filtered, dried, pulverized, and screened.

After the refractory becomes too cool for efficient conversion, the flow of gas is stopped and the refractory is again heated.

In the thermal decomposition process results are influenced by many factors including furnace design, type and shape of refractory, shape and arrangement of exposed surfaces, method of heating the refractory, use of preheated air, direction of flames in the "heat" cycle and of the flow of gas in the "make" cycle, dilution and velocity as well as distance the gas travels during cracking, temperature of refractory, and the time of each period.

The cracked gas produced in the process consists largely of hydrogen, and can be utilized for the synthetic production of ammonia, as a fuel, or as a diluent of the natural gas in the "make" period to modify the quality of the black. At Shell Point, Calif., Shell Chemical Co. operates a thermal decomposition plant on refinery waste gases by the Pyzel process, the main purpose of which is to produce hydrogen for ammonia synthesis. Carbon black is a byproduct.

Yields of carbon black from thermal decomposition of gas may run as high as 16 lb. per 1,000 cu. ft., depending on the quality of the gas, the extent of decomposition, the type and spacing of refractory, the process used, and the quality of the black produced.

Blacks produced by thermal decomposition are not pelleted since they are sufficiently high in bulk, usually in excess of 30 lb. per cu. ft. Also its looseness is no drawback to the rubber compounder as regards dusting.

Classification of Carbon Blacks

Channel blacks are called gas black, carbon black, channel black, impingement black, active black, reinforcing black, and "hard" black, to differentiate them from furnace blacks which were called "soft." The chemicals bureau, WPB, has classified carbon blacks in accordance with their loading capacity and reinforcing properties.

The final test of any black is an evaluation of its actual usefulness. If it is to be used for rubber, it is primarily examined in a test stock for processing, rate of cure, reinforcement, heat generation, resiliency, heat embrittlement, aging, electrical resistivity and resistance to wear, flexing, and cut growth. If the black is intended for inks, paints, varnishes, or resins, it is examined for oil absorption, ease of grinding, dispersibility, flow, color, intensity, tone, and gloss.

References

1. Drogin, Isaac, "Developments and Status of Carbon Black," United Carbon Co., Inc., Charleston, W. Va., 1945.
2. Gallie, John F., "Carbon Black and Its Relation to the Natural Gas Industry," Interstate Oil Compact Quarterly Bulletin, p. 135, June 1945, Oklahoma City.
3. Lott, F. S., and H. Backus, "Carbon Black," Minerals Yearbook 1944, Bureau of Mines, U. S. Dept. of the Interior.
4. Collyer, John L., "Rubber," S.A.E. annual meeting paper, Detroit, Jan. 7, 1946.
5. "Natural Gas," The Lamp, p. 2, Dec. 1945, Standard Oil Co. (N. J.).

Engineering Fundamentals

No. 225

A FEATURE OF THE OIL AND GAS JOURNAL

Permeability Trap Reservoirs

PERMEABILITY is a fundamental factor in the formation of petroleum reservoirs, and the lateral gradation from permeability to impermeability of a reservoir bed is a type of trap which frequently causes local accumulation of oil and gas. Convex trap reservoirs are accumulations of petroleum in a favorable convex structure and have an uninterrupted edge water entirely surrounding the reservoir. Typical permeability trap reservoirs differ from the convex trap type in that the edge-water limit is interrupted at the updip side of the reservoir area and replaced by the impermeable barrier which results from the lateral disappearance of permeability in reservoir bed. Since lateral gradation in permeability is a common phenomenon, convex trap reservoirs modified on one side by a permeability barrier, Type 1 of Fig. 1, are frequent, for example, the Montebello field of California. In order to form the typical permeability trap reservoirs, 2, 3, or 4 (Fig. 1), the updip limit of effective porosity must cross the axis of the anticline or of the structural nose or pass diagonally across the terrace. In the monoclinal reservoir, 5, the edge of porosity has to form a salient pointing updip; on a plunging syncline, permeability must disappear in all updip directions to produce a synclinal reservoir, 6.

Reservoirs 3, 4, and 5 (Fig. 1), on structural salients, terraces, and monoclines are common. Also, the synclinal type, 6, deserves consideration since plunging syncline environments are abundant and connected with many types of structural systems. Such environments occur on the sides of structural salients, between salients of minor and major structural systems, between **en echelon** anticlinal folds, between the branches of forking anticlines, on the flanks of folds crossing regional monoclines, and along hinge faults (Fig. 2).

Many permeability traps show differential thickness in porosity over the entire reservoir area, thus exhibiting "simple convex trap" affinities. Reservoirs controlled by both convex and permeability traps, as illustrated in Fig. 3, may be called modified permeability trap reservoirs and are of some importance. In comparing the Type 3 reservoir (Fig. 1) with the Type 8 reservoir (Fig. 3), the former shows an abrupt permeability barrier, with a reservoir top and edge-water limit that are essentially parallel with the subsurface contours. In reservoir 8 the thickness of the reservoir bed increases gradually across the reservoir area and therefore the edge-water limit does not conform with the structural contours. This differentiates all modified permeability types from the corresponding permeability types. Reservoir 9, added on Fig. 3, occurs in a reservoir bed that is identical with the one containing reservoir 8, but, on account of a small size in the accumulation, reservoir 9 does not extend into the permeability trap. One significant conclusion can be drawn from this, namely, that under certain conditions negative evidence for a permeability trap reservoir does not quite preclude the presence of a simple convex trap reservoir in same reservoir bed and on same structure.

ON FLANK & BETWEEN STRUCTURAL SALIENTS
ON BIFURCATING ANTICLINE AND BETWEEN EN ECHELON ANTICLINAL FOLDS
ON FLANK OF FOLD CROSSING REGIONAL MONOCLINE
ALONG HINGE FAULT

Fig. 2—Plunging synclinal environments

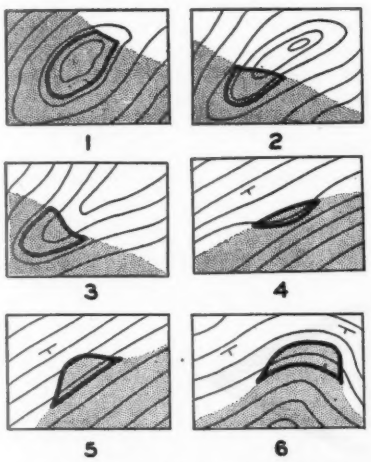


Fig. 1—Permeability trap reservoirs

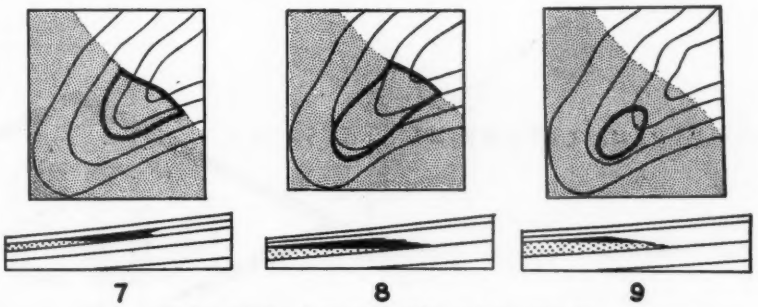
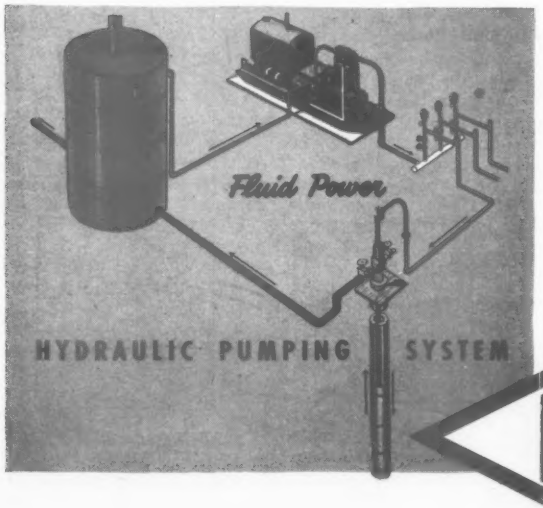


Fig. 3—Relation between B, B/A, and A reservoirs

Series prepared by Dr. O. Wilhelm, Shell Oil Co., Inc. (A. A. P. G. Bulletin Vol. 29, No. 11)

It's as easy as turning on the tap...

LET *Fluid Power* SIMPLIFY YOUR PUMPING!



★ Changing the pumping rate of any well, under the Kobe Hydraulic Pumping System, is as easy as turning on your kitchen tap. A twist of a manifold valve, at your central power plant, does the trick.

Neither distance nor depth affects this ease of operation. *Fluid Power*—oil under pressure—works as magically at the bottom of a 10,000-foot well, a mile away, as it does in a 1500-foot well across the road from the pumping station. Pumping pressures can be varied between wells from a few pounds to several thousand pounds; one well can be pumped at 50 barrels a day and another at 1000 barrels.

Ask the Kobe representative in your area to show you how convenient and economical it is to pump with Kobe *Fluid Power*.

PUMP THE MODERN WAY —USE KOBE

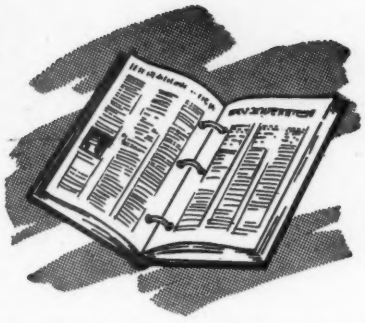
KOBE

ONE OF THE DRESSER INDUSTRIES

KOBE, Inc.—*GENERAL OFFICES: HUNTINGTON PARK, CALIF.; DIVISION & DISTRICT OFFICES: BAKERSFIELD & HUNTINGTON PARK, CALIF.; OKLAHOMA CITY & TULSA, OKLA.; BROWNFIELD, DALLAS, ODESSA, LONGVIEW, HOUSTON & WICHITA FALLS, TEX.; GREAT BEND, KAN.; N. Y. C.*

The Refiner's Notebook

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL



Shells and Baffles

SHELLS are constructed of seamless tubing if pressure is great (125 psig. or more) or of cast metal for lower pressure. The bore is then machined so that the floating head and baffles fit the shell from end to end with a clearance of only 1/64 to 1/32 in. Thicknesses of welded or forged vessels are computed by the formulas of the A.P.I.-A.S.M.E. code for unfired pressure vessels but extra thicknesses are usually allowed for stiffness and rigidity. Smaller thicknesses than ½ in. for cast iron, cast steel, etc., or ⅜ in. for cast brasses and bronzes are seldom employed regardless of strength computations. For general design the following formulas may be used for cast shells or vessels:

For cylindrical shells:

$$T = \frac{Pd}{K_1} + 0.125$$

For circular flat surfaces:

$$T^2 = \frac{Pd^2}{K_2}$$

in which T is the thickness in inches; P is the internal pressure, psig.; d is inside diameter of vessel or circle, inches, and K is a constant.

	K_1	K_2
Cast iron	4,000	24,000
Cast steel	10,000	52,000
60-40 brass	6,000	30,000

Although cast iron is the common material, it should not be used above 400° F. or at pressures above 150 psi., and hence cast steel, forged steel, or welded steel is used for more severe conditions. Gun metal (60-40 brass) is sometimes used for shells if corrosion demands and it is usually necessary to use brass tube sheets with admiralty or brass tubes to avoid electrolytic corrosion between the tubes and tube sheet. It is necessary that the tube-sheet material be harder than the tube material in order to insure that the rolled-in tube joint will remain tight. Common shell and tube sheet materials are shown in Table 1. In addition many varieties of low-alloy steels and copper-base alloys are less frequently used.

Occasionally turbulence creators in the way of spiral strips are placed inside the tubes but their use is confined to clean viscous fluids. The use of several tube passes is usually preferable.

Many types of baffles for the shell side of exchangers have been employed (see Petroleum Refinery Engineering, McGraw-Hill Book Co., New York) but crossbaffles of the varieties shown in Fig. 1 are now used almost exclusively. Another modification of crossbaffles was shown in Fig. 2, The Refiner's Notebook No. 81 (Double Pipe Exchanger), page 129. Clearance between tubes and baffle sheets can be kept to 0.02 in. and between the baffle sheet and shell to 1/32 in. without great difficulty and such small clearances are advisable to prevent leakage and bypassing. Orifice baffles in which the liquid leaks from baffle to baffle by flowing through the tube holes tend to become plugged and occasionally to cause erosion. Spiral-shaped baffles can be fabricated only with difficulty and bypassing of liquid near the shell tends to occur.

Longitudinal baffles are used for many vapor condensers and may be used for liquid exchangers if a separate floating head is used on each side of the baffle so the baffle can be welded to the shell. Other applications are difficult because the baffle cannot be properly sealed to the shell and because corrosion tends to freeze it to the shell.

TABLE 1—COMMON MATERIALS FOR SHELLS, HEADS, AND COVER PLATES OF EXCHANGERS—A.S.T.M. STANDARDS
Chemical Composition, Percentage

Plate work:	C	Mn	Si	Ni	Mo	Cr	Cu	Zn	Sn	Pb	Al
Carbon steel	.25	.80									
Silicon steel	.28-.31	.90	.15-.30								
Nickel steel	.17-.25	.80	.15-.30	2.0-2.75							
Molybdenum steel	.18-.23	.90	.15-.30		.4-.6						
Stainless steel	.08-.12	0.6-2.5	.75-.85	.6-1.0		12-17					
	.12-.35	1.0	1.0	0.6		11.5-27					
	.08-.25	1.5-2.0	1.0-3.5	6.0-22.0		16-26					
Silicon bronze plate		1.25-1.5	3.0-3.5				91-94.8	1.5-4.5			
Castings:											
Steel to 850° F.	.25-.35	.70	.60								
Moly steel to 1,100° F.	.2-.3	.4-.7	.25-.6	0-1.05	.3-.6	0-.70					
Leaded bronze							85	5	5	5	
Cast iron	(All grades from 20,000 to 60,000 psi.)										
Tube sheets:											
Muntz metal							58-61	39-42			
Naval brass							59-61	38-40	1.0		
Admiralty metal							70-73	26-29	1.0		
Copper nickel				29-33			65-69		1.5		
Aluminum bronze				4-7			rest	(1.5-3.5 iron)			8-10

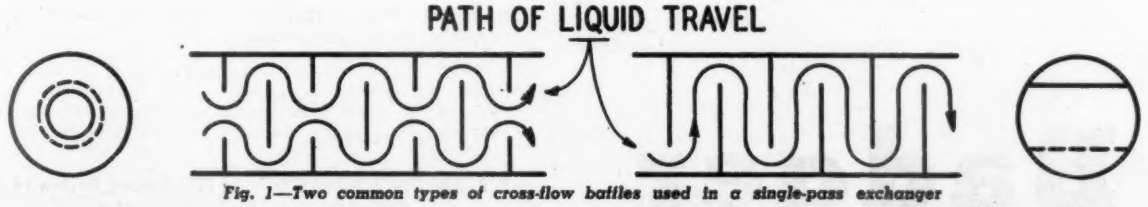


Fig. 1—Two common types of cross-flow baffles used in a single-pass exchanger

No. 84 in a series by W. L. Nelson, professor of petroleum refinery engineering, University of Tulsa

Unfailing action

Even distribution of stresses

Definite maximum traverse

Fixed safety limits

If it's Badger made it's got something

EVERY corrugation in a Badger Self-equalizing Expansion Joint has a job to do. And it does it! It can't shift its responsibility. It must handle its share of the load equally with the other corrugations—because:

Its traverse range is predetermined, from its depth and the diameter of the joint. Then—

Its flexing is *directed*, and held to the predetermined standard by exclusive (patented) Badger DIRECTED FLEXING equalizing rings. The ALL-CURVE engaging surface of the rings conforms to the ALL-CURVE shape of the corrugation. The combination assures even distribution of stresses (1) among all the corrugations, and (2) over the entire surface of each corrugation itself. (ALL-CURVE design eliminates pockets, corners or junctions in which stresses tend to localize.)

Thus, when you've a high-temperature or high-pressure line that must be allowed a certain maximum longitudinal movement, you can determine exactly what size joint (number of corrugations) is required. No needless, costly oversize; no inadequate, disaster-threatening undersize! No guesswork—for DIRECTED FLEXING, plus Badger's special methods of forming corrugations uniformly, provide *known factors* that make the following Badger standards absolutely dependable:

Diameter	*Depth of Corrugation*	*Traverse per Corrugation*
4" and 5"	1⅛"	5/16"
6"	1¾"	½"
8" and 10"	2¼"	5/8"
12" and larger	2¾"	¾"

MADE IN COPPER, STAINLESS STEEL AND OTHER ALLOYS — Copper for normal pressures and temperatures; Stainless Steel and other alloys for higher requirements—and where corrosion is a problem. Single or multiple corrugations—for traverses from a fraction of an inch upward. Also made in Non-equalizing type (without rings) for uses that do not require added protection. SEND FOR BULLETIN NO. 100 (*Self-equalizing*) or No. 200 (*Non-equalizing*).

Badger

E. B. BADGER & SONS CO. • 75 Pitts Street, Boston 14, Mass.

AGENTS IN PRINCIPAL CITIES

PACKLESS CORRUGATED EXPANSION JOINTS

REFINING

Summer Operation Set for Colorado Shale Oil Plant

WASHINGTON. — The Bureau of Mines is pushing ahead with its large-scale experimentation program of producing oil from shale, hoping to have the demonstration plant at Rifle, Colo., in operation by summer.

Prefabricated houses are being moved into the area, water lines laid, roads widened, and other preliminary work completed. The bureau is asking a $7,000,000 appropriation to continue research into synthetic fuels.

In connection with a larger mine planned at the Rifle project, an agreement has been reached with Columbia University for the use of its barodynamic laboratory to determine the physical characteristics of the shale on Naval Reserve 1. Further core drilling will be conducted next summer. Work on the deepest of three holes sunk at the mine site was suspended at 514 ft. but will be continued to 2,000 ft. by next summer. Completion in May is sought for the oil-shale research and development laboratory under construction at Laramie, Wyo.

At a recent meeting in Washington of engineers and geophysicists from industry, the Army, Navy and other government agencies, it was said that shale oil cannot be expected to pass through the experimentation stage for another 10 years. However, experiments at Rifle indicate that shale oil can be produced at a cost of $1 to $2 a barrel if shale can be mined for $1 to $1.50 a ton.

Cost of the entire shale-oil operation of mining, retorting, and refining is a primary objective of the work at Rifle and at Laramie. At present, little is known of costs of mining, although estimates place it roughly at 50 cents a ton.

In another announcement connected with the synthetic fuels program, G. R. Strimbeck, former superintendent of the coke and gas division of the Morgantown, W. Va., Ordnance Works, was named chief of the gas-making processes section of the bureau's new synthetic liquid fuels laboratory at the University of West Virginia. Dr. L. D. Schmidt, formerly with the bureau's fuel laboratories at Pittsburgh, was appointed supervising engineer of the laboratory.

Alcohol Butadiene Plant Will Resume Production

WASHINGTON. — Latest estimates on natural rubber available during 1946 are 100,000 tons lower than earlier forecasts. Consequently, production of butadiene from industrial alcohol has been resumed at the Institute, W. Va., plant, operated by Carbide & Carbon Chemical Corp.

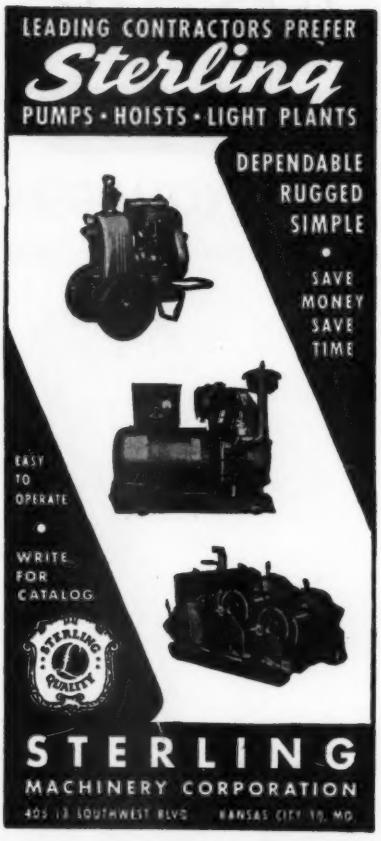
RFC officials said the Institute butadiene plant can produce sufficient butadiene from alcohol for approximately 150,000 long tons a year of GR-S, general-purpose synthetic rubber. However, full production is not expected to be necessary to meet the present schedule.

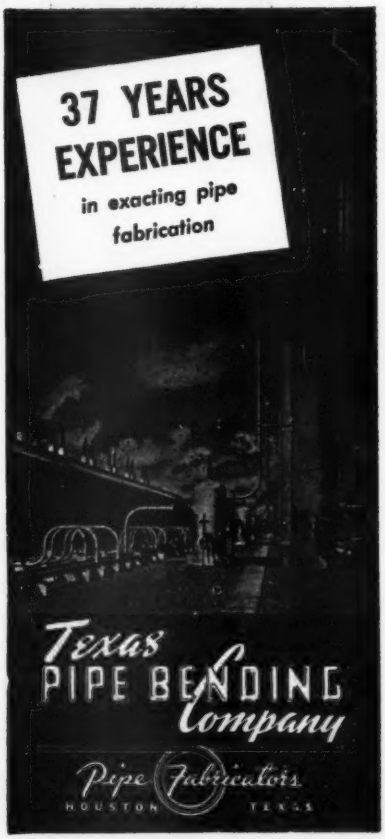
Sun Refinery Launches New Safety Campaign

MARCUS HOOK, Pa.—An expanded 1946 safety campaign has been launched at Sun Oil Co.'s Marcus Hook refinery, according to A. M. MacMurtrie, refinery manager, who states

OIL and GAS
BURNING EQUIPMENT
NATIONAL
AIROIL
BURNERS
1236 E. Sedgley Ave.
PHILADELPHIA 34, PENNA.

Steel Plate
Fabricators and
Contractors
•
Products storage
•
Pressure vessels
McNAMAR
BOILER & TANK CO.
Tulsa, Okla.





ADSCO

HEAT EXCHANGERS

Straight Tube & U Tube Types

● Wherever industrial processes involve heating and cooling of liquids, ADSCO provides a complete line of horizontal and vertical heat exchangers. Available in a wide range of sizes built to standard and custom requirements and fabricated with ferrous and non-ferrous alloys. ADSCO engineers are at your service to aid in selecting or designing heat exchangers to meet your needs.

Write for Bulletin 35-76 O

AMERICAN DISTRICT STEAM CO.

N. TONAWANDA, N. Y.

that the company has been greatly encouraged by a drop in the accident ratio in 1945.

The 1945 campaign is credited with a 29 per cent drop in the number of accidents and reductions as high as 94 per cent in severity and number of days lost. The accident frequency rate at the refinery declined 22 per cent.

William J. Noctor, director of the safety campaign in 1945, has been selected to continue as director of the 1946 campaign.

Gas Oils Drop, Other Stocks Rise in Gulf Coast Plants

HOUSTON.—An increase in stocks of all products except gas oils is reported by 10 Texas Gulf Coast independent refineries for the first half of February with runs to stills at the rate of 83.2 per cent of operating capacity.

Total stocks of all products in the plants of the Gulf Coast Refiners Association stood at 3,613,430 bbl. February 15—an increase of 181,353 bbl. in the 2 weeks period. A year ago stocks were 3,968,977 bbl. Normal prewar stocks of all products ranged around 5,000,000 bbl.

Stocks of all grades of gasoline and naphthas increased during the period by 245,430 bbl. and were reported at 2,080,588 bbl. Automotive gasoline stocks considered alone were 1,109,664 bbl., showing an increase of 88,240 bbl. Aviation stocks showed a slight rise from 352,596 bbl. February 1 to 362,034 bbl. February 15.

Gasoline Specifications Relaxed by Government

WASHINGTON.—Stringent motor fuel specifications have been relaxed by the Government to permit the prewar sulfur content for all gasoline except that furnished to the Army and Navy.

The Federal Specifications Board approved the new requirements after conferences between its special technical committee and another group representing the American Society of Testing Materials. A maximum 0.25 per cent sulfur content is continued for Army and Navy gasoline, while 0.1 per cent is permitted for other agencies.

As originally proposed, the specifications were protested by industry groups which contended that there was no reason why government agencies, such as the postoffice department, should demand the same low-sulfur content as the armed services. In the new specifications motor fuel M is designated in two types—74 and 80 octane—with different specifications provided for four locality groups in various seasons. The specifications state that fuel will "not require special processing other than that generally employed for commercial production of regular and premium motor fuel for use by the general public," and will be "volatile hydrocarbon fuel, free from water and suspended matter." Permitted R.v.p. for both 74 and 80 octane ranges from 9 to 13 lb.

Duncan Plant Up for Sale

WASHINGTON.—The Duncan, Okla., refinery at which Associated Refineries, Inc., produced 100-octane gasoline during the war, has been added to the list of war surplus properties offered for sale or lease by the War Assets Corp. Capacity of the plant, which cost $14,398,000, is rated at 4,200 bbl. a day.

FOR A GOOD, HONEST WATER CONDITIONING JOB... LARGE OR SMALL

Call JOHN FIELD-MAN ON YOUR NEXT WATER CONDITIONING JOB

LELAND HAMNER CO.

P.O. Box 1065 · Capitol 9758 · Long Distance LD 2175

2211 PRESTON AVE. HOUSTON, TEXAS

We design and construct all types of modern refining units.

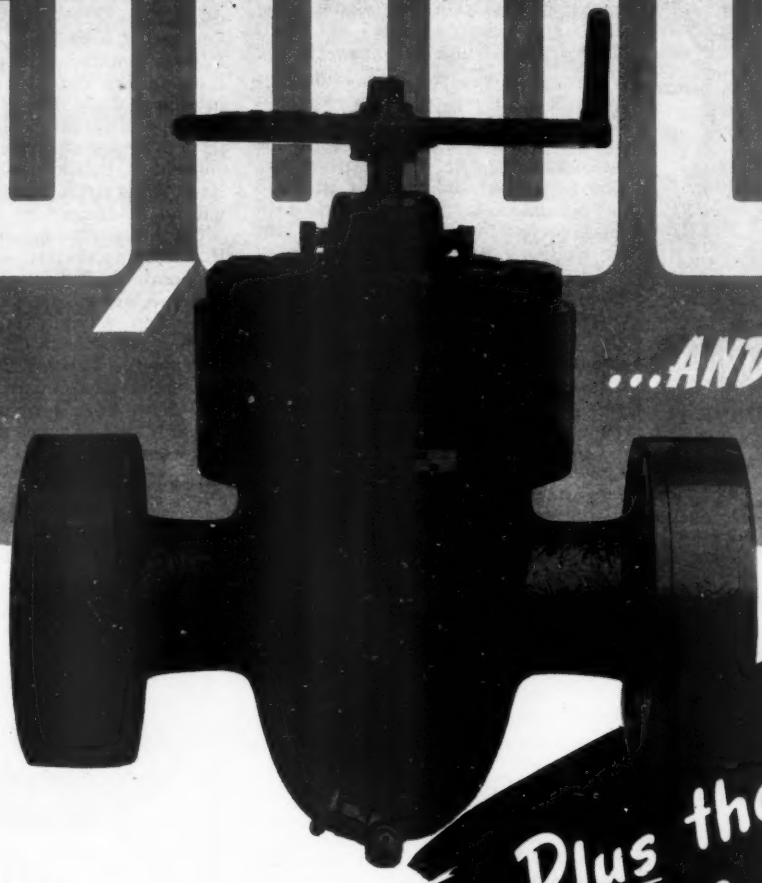
★ Serving the Industry Since 1915

BORN ENGINEERING CO.

Tulsa, Oklahoma

15,000 lbs test

...AND THEN SOME



Plus the same exclusive, dependable W-K-M GATE VALVE FEATURES

"It's performing just like a W-K-M Valve," and that's just about the best testimony we know for W-K-M's answer to the industry's need for a high-test Christmas tree valve. This new 15,000 lbs. test W-K-M Through Conduit Gate Valve . . . the first offered the industry . . . utilizes the time-proven features of design which have distinguished W-K-M Valves and made them stand-out favorites in the lower pressure field. It has a round, smooth through-conduit opening . . . parallel expanding gates . . . oversized bronze renewable seats . . . and positive, trouble-free lubrication. It is manufactured to "X-ray standards" and tested more than twice its rated pressure. The body, bonnet and stem are Magnaflux (magnetic particle) inspected. All steel parts are heat-treated to provide the most favorable physical properties.

Now, you can get W-K-M dependability on both your high and low pressure trees. Don't accept less than W-K-M's exclusive valve features offer.

W-K-M Company, Inc.

OIL FIELD, PIPE LINE & INDUSTRIAL EQUIPMENT

HOUSTON, TEXAS, U. S. A.
LOS ANGELES

Cable Address: "WILKOMAC"
Export Office: 30 Rockefeller Plaza, New York, N. Y.

CRC
PIPE LINE CONSTRUCTION EQUIPMENT
CRUTCHER-ROLFS-CUMMINGS
Pipe Line Equipment and Materials
Houston, Texas, U. S. A.

Reilly
PIPE ENAMEL
FOR
DEPENDABLE
PROTECTION
On Oil, Gas, Gasoline
and Water Lines
Reilly COAL TAR PRODUCTS
17 PLANTS
To Serve
THE NATION
REILLY TAR & CHEMICAL
CORPORATION
Merchants Bank Bldg., Indianapolis
500 Fifth Ave., New York • 2513 S. Damen Ave., Chicago

PIPE LINES

Interstate's New Mattoon Line Placed in Operation

MATTOON, Ill.—Interstate Oil Pipe Line Co.'s new crude outlet for the Mattoon field (Illinois) has been placed in operation and is now delivering approximately 7,800 bbl. daily to two main trunk systems.

A new 8-in. line was laid from Montrose station of Ohio Oil Co. northward about 20 miles. A 6-in. line extends 4 miles through the field and is connected with the Mattoon station of Texas-Empire Pipe Line Co.

Through this arrangement, it is possible for Interstate Oil Pipe Line to deliver to the trunk lines of either of the other two companies. To complete the system, Interstate purchased from Loudon Pipe Line Co. a gathering network consisting of about 4 miles of 3-in. and 1 mile of 2-in. line, six field pumping units, two 5,000-bbl. tanks, three of smaller dimensions, and other equipment.

Current deliveries approximate 6,200 bbl. daily to Ohio Oil's Montrose station, and 1,600 bbl. daily to the Texas-Empire connection — substantially the total output of Mattoon field. Deliveries are being made from the small tanks acquired from Loudon Pipe Line Co. pending removal of a 30,000 bbl. tank from Fitts field in Oklahoma to Montrose and a 35,000-bbl. tank from Brownstown, Ill.

Field pumping units are being used for the entire line at present.

Experts, Officials Cool to New York Pipe Line Ideas

NEW YORK.—Pipe lines extending into the metropolitan area of this city have been suggested by some New Yorkers to forestall another fuel oil emergency but public officials and industry experts are doubtful of the economic feasibility of the proposal.

The lines came under serious consideration when the city was closed down at the climax of a strike of 3,500 tugboat workers which shut off supplies brought by barges from across the Hudson River for New York's 7,500,000 inhabitants. One suggested pipe line route would begin at Bayway, N. J., the center of a large refining area, run underground across Staten Island, under the Narrows and into Brooklyn, considered to be the largest fuel-oil consumer in the world.

Another proposed line to supply Manhattan and northern New York would lead from New Haven, Conn., where tanker terminal, storage and pumping facilities might be installed, through Connecticut, Westchester County, and to the Bronx.

Both representatives of the oil industry and public officials, however, doubted if such lines are practicable. It was pointed out construction of lines in the densely populated area of metropolitan New York presents an entirely different problem from that in western states. Extension of the suggested Brooklyn line under the East River into Manhattan was regarded as extremely difficult.

Oil industry engineers made it clear that nothing definite on the pipe line proposals will be known unless an engineering and cost survey is made, but they pointed out that waterborne transportation is generally cheaper for seacoast cities. Executives doubt that the industry would initiate any New York pipe-line project because of the varying problems of the different companies serving New

WHEN
YOU WANT
The Best
IN
PIPELINE
CONSTRUCTION
OKLAHOMA
CONTRACTING
COMPANY
DALLAS
TEXAS
SOUTH AMERICA
APARTADO 1085
CARACAS, VENEZUELA

MOLE
Pipeline
Cleaner

For BETTER cleaning of
CRUDE LINES
PRODUCT LINES
NATURAL GAS LINES

FOR DETAILS WRITE

Pipeline Cleaners Co.
Fort Madison, Iowa

ANDERSON BROTHERS
Pipe Line
Contractors and Engineers
707 NORTH DRENNAN
HOUSTON, TEXAS

. . . . . with MODERN,
EFFICIENT EQUIPMENT
. . . AND PLENTY OF IT!

above all
EXPERIENCE

Not just Contractors
but
PIPE LINE
SPECIALISTS

York and the widespread fear of collusion and antitrust charges throughout the industry. The logical place for such a project to be initiated, they said, is in a government agency such as the Port of New York authority.

Another Warbuilt System Given Peacetime Role

INDIANAPOLIS.—Another case of successful conversion of warbuilt facilities to important peacetime use is furnished here by Ohio Oil Co.'s products terminal and the 105-mile supply pipe line.

Originally conceived as a wartime measure to meet the transportation problem resulting from the tank-car shortage, the properties are now playing an important part in serving an expanding peacetime market in Indiana.

The 8-in. pipe line extends from the company's Robinson, Ill., refinery and at present delivers gasoline, kerosene, and fuel oil to the terminal. Work on the terminal was begun in September 1944, after 500,000 yd. of dirt was used to fill the site which was partly below high-water level and subject to periodic flooding from a nearby creek.

Company officials consider that the terminal now represents the "last word" in installations of its type. Present storage tanks have a capacity of slightly under 14,000,000 gal. with room in the area for additional tankage of 12,000,000 gal. Two 55,000-bbl. gasoline tanks are equipped with floating roofs. Four truck transports or five tank cars can be simultaneously loaded, and one 10,000-gal. tank car can be filled in 5 minutes. Vance Anderson is superintendent of the terminal which is located at Speedway, an Indianapolis suburb, where the annual auto races are held.

Right-of-Way Cleared For Lone Star's New Carrier

DALLAS. — Construction of a 79-mile 14-in. pipe line from Carthage to Opelika to tie the Lone Star Gas Co. system into the Panola County producing field is now under way.

Right-of-way crews of the Oklahoma Contracting Co. which is building the line have completed the preliminary work of clearing the route through the heavily-timbered and swampy East Texas country. The line will carry a maximum of 1,200-lb. pressure, highest in the Lone Star system.

The Carthage end of the line will be linked into Lone Star's new Panola County cycling plant now being built. The route of the new line touches Brownsboro, runs south of Tyler, north of Overton and north of Henderson.

adeco...

NOZZLE TESTER
Keeps Diesel Engines Running Efficiently

To keep diesel engines operating at peak efficiency, this portable, precision-built Adeco Nozzle Tester is indispensable.

Light in weight yet built for heavy-duty service, it enables any mechanic to make quick accurate tests on injector opening pressure, spray pattern, etc., and detect stuck needle valves and leakage around valve seats. Tests both large and small injectors, on bench or engine, at pressures up to 10,000 p.s.i. Prevents costly delays and possible damage to engine.

Ideal for testing hydraulic devices.

Write for bulletin on this practical, low-cost unit.

TESTS FUEL INJECTORS AND HYDRAULIC DEVICES at Pressures up to 10,000 p.s.i.

ADECO
AIRCRAFT & DIESEL EQUIPMENT CORP.
DEPT. 7: 4411 N. RAVENSWOOD AVE.
CHICAGO 40, ILLINOIS

Natural Gas

West Texas Gas Hearing Scheduled for March 28

MIDLAND. — Fields in the West, West-Central, and Panhandle districts of Texas will be brought into the Railroad Commission's current investigation of gas wastage with a hearing due here March 28.

Previous hearings have been held in Corpus Christi and Houston. The commission, seeking facts for possible further gas-conserving regulations, will go into such questions as returning gas to the producing horizons, gas-oil ratios, present disposition of gas, content of the gas, and feasibility of storing gas in depleted oil reservoirs.

Milener Becomes A.G.A. Research Coordinator

NEW YORK.—Eugene D. Milener has been named coordinator of general research of the American Gas Association and placed in charge of coordinating general and technical utilization research of the organization.

Mahlon A. Combs, formerly assistant secretary of the industrial and commercial gas section, was advanced to section secretary to succeed Milener. Milener will continue to serve as secretary of the coordinating committee on research, the domestic gas research committee, and the industrial and commercial gas research committee. Milener was graduated from Baltimore Polytechnic Institute and the University of Maryland and also studied engineering at Johns Hopkins University. He left Consolidated Gas Electric Light & Power Co. in 1928 to join the A.G.A. staff in connection with the industrial gas utilization program.

FPC Approval Sought for Extension Line in Texas

WASHINGTON.—Construction of a 95-mile pipe line in Texas which would allow delivery of more gas to the West Virginia trunk line of Tennessee Gas & Transmission Co. is proposed in an application filed by the company with the Federal Power Commission.

The new line would extend from San Salvador field in Hidalgo County, Texas, to the vicinity of Corpus Christi where it would connect with the West Virginia line. L. L. Tonkin, president of Hope Natural Gas Co., also is urging the commission to approve the application.

Work on Stanolind Plant To Start in Few Months

HOUSTON. — Delayed by materials shortages, construction work on the new $4,000,000 natural gasoline plant of Stanolind Oil & Gas Co. near Alvin is expected to start in the next few months.

The plant, located 6 miles north of Alvin on the Houston-Galveston highway, will utilize between 25,000,000 and 30,000,000 cu. ft. of gas daily from flow now being largely wasted in the Hastings field. Completion is expected in about six months after beginning of work. Site for the plant has been cleared.

Texas Carbon Black Output Shows Large Gain in 1945

AUSTIN.—Texas production of carbon black in 1945 totaled 662,912,593 lb.—179,634,217 lb. more than the 1944 output. The state had 92,200,995 lb. of carbon black stored in 1945, compared with a 1944 inventory of 54,558,974 lb.

The engineering department of the Oil and Gas Division, Texas Railroad Commission, which compiled the figures, said total gas production in Texas in 1945 was approximately 213,000,000,000 cu. ft. more than in 1944.

L.G.P. Association Opens Headquarters in Chicago

CHICAGO.—The Liquefied Petroleum Gas Association has opened its office here at 11 South La Salle St., room 1130, in conformity with the executive vote taken last month to establish national headquarters in Chicago. Howard D. White is the newly appointed executive vice president of the organization.

A.G.A. Meetings Scheduled

NEW YORK.—Two annual conferences have been scheduled by committees of the technical section of the American Gas Association. A joint production and chemical committee conference will be held at the Pennsylvania hotel, New York, June 3-5; distribution and motor vehicle conference at the Hotel Stevens, Chicago, April 16-18.

Natural Gasoline

Test Runs Made on New Natural-Gasoline Plant

MIDLAND, Tex. — Completed sections of the new natural-gasoline plant being built in Emperor field in central Winkler County by C. V. Lyman, Midland operator, are now undergoing test runs.

The plant with its companion repressuring unit is designed to handle 15,000,000 cu. ft. daily. The gas will be used to repressure several leases in the field with the residue sold to El Paso Natural Gas Co. A 12.6-mile line is being built by El Paso Natural from its Jal-Keystone system to the new plant. Natural gasoline and other products from the plant will be sold to the El Paso refinery of Standard Oil Co. of Texas.

Kansas Plants Produced 73,591,080 Gal. in 1945

WICHITA.—A total of 73,591,080 gal. of gasoline, propane, and butane was produced in 1945 by Kansas' 13 natural gasoline plants, according to a report of the Conservation Division of the State Corporation Commission.

Production averaged 4,800 bbl. daily. A breakdown showed the total consisted of 60,379,067 gal. of gasoline, 10,900,882 gal. of butane, and 2,311,131 gal. of propane. Production from various plants follows (figures in gallons):

Cities Service Oil Co. — Wichita: propane, 2,300,910; butane, 3,891,251; gasoline, 18,199,375; Burrton: propane, 10,221; butane, 2,818,817; gasoline, 6,063,502; Arkansas City: gasoline, 3,798,865.

Edward Gasoline Co.—Zenith: gasoline, 700,977.

Flynn Oil Co.—Otis: butane, 53,484; gasoline, 1,192,029.

Kansas Power & Light Co.—Medicine Lodge: gasoline, 3,959,818; McPherson: gasoline, 1,033,539.

Northern Natural Gas Co.—Hugoton: gasoline, 6,746,727.

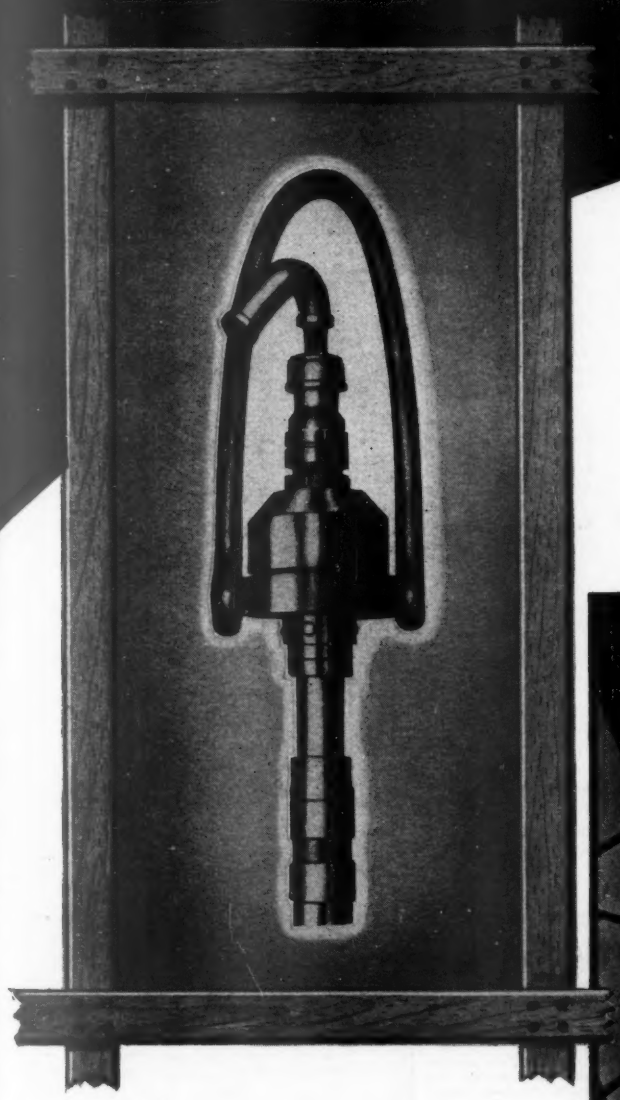
Panhandle Eastern Pipe Line Co.—Arkalon: gasoline, 10,191,895.

Phillips Petroleum Co.—Demalorie-Souders: gasoline, 1,133,140; Scott: gasoline, 451,092.

Skelly Oil Co.—Cunningham: butane, 4,137,330; gasoline, 4,908,108.

The Texas Co.—Atlanta (estimated), gasoline, 2,000,000.

1912 when Continental was Founded . . .



▲ If you were a rotary driller 34 years ago, the swivel on your rig probably looked like the one shown on the left. It was a good piece of equipment for the job of that day. But it soon became obsolete as greater depths and tougher going called for better equipment.

▲ The equipment manufacturers have, through years, kept pace with the ever increasing production demands. And during these 34 years of serving the oil and gas industries, The Continental Supply Company has made the "Green Triangle" a familiar sign throughout the oil country.

Emsco Type H Swivel

THE CONTINENTAL SUPPLY COMPANY
General Offices: DALLAS, TEXAS
EXPORT DIVISION
30 Rockefeller Plaza New York City, N. Y.
Representatives
MEXICO · ARGENTINA · ENGLAND · TRINIDAD
BRAZIL · VENEZUELA · COLOMBIA · CHILE

CONTINENTAL

SERVING THE OIL AND GAS INDUSTRIES

STATISTICS and

WEEKLY WELL COMPLETIONS . . . WEEK ENDED MARCH 2, 1946

	Total of all wells					Cum. to date		Wildcat completions and discoveries					Cumulative total, 1946				
	Comp.	Oil	Gas	Dry	Footage	1946	1945	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	27	14	0	*13	44,313	256	250	0	0	0	0	0	0	0	0	0	0
Pennsylvania	65	34	0	†31	110,283	730	549	0	0	0	0	0	0	0	0	0	0
West Virginia	17	0	16	1	51,632	105	88	0	0	0	0	0	0	0	0	0	0
Ohio	14	3	9	2	36,863	168	119	0	0	0	0	0	1	0	5	6	12
Indiana	7	5	0	2	15,070	51	35	0	0	0	1	1	0	0	0	6	6
Kentucky	10	7	3	0	21,114	74	68	0	0	0	0	0	1	0	0	9	10
Illinois	30	24	0	6	75,767	318	305	3	0	0	4	7	7	0	0	58	65
Michigan	12	5	1	6	26,721	112	119	2	0	0	3	5	3	0	0	37	40
Kansas	24	14	1	9	77,292	348	248	0	0	0	1	1	4	0	1	43	48
Neb., Mo., Iowa	1	0	0	1	1,400	4	9	0	0	0	1	1	0	0	0	2	2
Oklahoma	37	21	1	‡15	152,238	409	409	3	0	0	2	5	13	0	7	54	74
Texas	145	94	10	41	599,930	1,297	1,190	3	0	0	13	16	22	1	5	183	211
North Central	53	32	2	§19	126,444	439	349	2	0	0	4	6	7	0	0	60	67
West	30	24	0	6	140,085	281	315	0	0	0	4	4	7	0	0	30	37
Panhandle	10	5	5	0	30,939	69	90	0	0	0	0	0	0	0	0	2	2
Eastern	12	8	2	2	63,292	118	48	0	0	0	1	1	1	0	1	22	24
Gulf Coast	31	23	0	8	215,124	307	275	0	0	0	2	2	4	0	2	45	51
Southwest	9	2	1	6	24,046	83	113	1	0	0	2	3	3	1	2	24	30
Louisiana	29	22	2	5	195,456	205	151	1	0	0	2	3	13	1	0	20	34
Northern	12	8	2	2	52,938	101	50	0	0	0	0	0	2	0	0	13	15
Southern	17	14	0	3	142,518	104	101	1	0	0	2	3	11	1	0	7	19
Arkansas	5	2	0	3	10,738	31	26	0	0	0	1	1	2	0	0	5	7
Mississippi	5	3	0	2	41,360	38	55	1	0	0	2	3	1	0	0	10	11
Southeastern States	0	0	0	0	0	8	4	0	0	0	0	0	0	0	0	7	7
Montana	2	1	0	1	3,332	41	51	0	0	0	0	0	0	0	0	2	2
Wyoming	2	1	0	1	7,992	31	40	1	0	0	1	2	3	0	2	12	17
Colorado	0	0	0	0	0	16	6	0	0	0	0	0	0	0	0	3	3
New Mexico, S. E.	5	3	0	2	16,686	69	87	0	0	0	0	0	1	0	0	6	7
California	29	25	2	2	152,655	299	391	0	0	1	1	2	3	0	2	33	38
Utah	1	0	0	1	1,580	2	1	0	0	0	1	1	1	0	0	1	2
Total United States	467	278	45	144	1,642,422	4,612	4,200	14	0	1	33	48	75	2	22	497	596
Total previous week	507	301	59	147	1,774,476	4,146	3,678	10	1	4	43	58	60	2	21	464	547
Total March 3, 1945	522	308	45	169	1,803,824	4,200	3,191	23	0	2	56	81	107	1	25	572	705

Service wells included: *13, †31, ‡1, §1.

MARKET QUOTATIONS

(Quotations on other products than those shown here furnished on request. Quotations are f.o.b. plant in tank cars and in cents per gal. as of last Monday.)

REFINERY GASOLINE

Octane (A.S.T.M.)	78-80†	73-75
Mid-Continent*	5.625-6.00	5.00-5.25
Texas Gulf Coast	6.375	5.375-5.75
New York Area		7.425-7.90
California		6.00-6.875

*Basic Oklahoma Group 3. †1939 C.F.R. (research method).

NATURAL GASOLINE

Grades:	26-70	18-55
Oklahoma (Group 3)	2.750	3.300
N. Texas (f.o.b. plant)	2.250	2.700
N. Louisiana (f.o.b. plant)	2.625	3.150
California	4.875	5.500

CRUDE-OIL PRICES

Representative posted schedules per bbl.	
East Texas	$1.25
Conroe	1.43
Tepetate, Louisiana, avg. grav.	1.20
Illinois Basin	1.37
Pecos County, Texas	.95
Bradford, Pennsylvania	3.00
Van, Van Zandt County, Texas	1.08

Note: Exclusive of subsidy.

GRAVITY SCHEDULES

Top prices include all gravities above grades designated, and low prices include all gravities below grades designated:

Gravity—	Signal Hill, Calif.	Oklahoma, Kansas	Gulf Coast Texas	West Tex.*
18-18.9	$0.80	....	....	....
19-19.9	.84	....	$1.06	$0.70
20-20.9	.86	$0.85	1.08	.72
21-21.9	.92	.87	1.10	.74
22-22.9	.96	.89	1.12	.76
23-23.9	1.00	.91	1.14	.78
24-24.9	1.03	.93	1.16	.80
25-25.9	1.07	.95	1.18	.82
26-26.9	1.11	.97	1.20	.84
27-27.9	1.15	.99	1.22	.86
28-28.9	1.18	1.01	1.24	.88
29-29.9	1.20	1.03	1.26	.90
30-30.9	1.23	1.05	1.28	.92
31-31.9	....	1.07	1.30	.94
32-32.9	....	1.09	1.32	.96
33-33.9	....	1.11	1.34	.98
34-34.9	....	1.13	1.36	1.00
35-35.9	....	1.15	1.38	1.02
36-36.9	....	1.17	1.40	1.04
37-37.9	....	1.19	1.42	1.06
38-38.9	....	1.21	1.44	1.08
39-39.9	....	1.23	1.46	1.10
40 and above	....	1.25	1.48	1.12

*Includes Lea County, New Mexico.

A.P.I. REFINERY REPORT

Week ended February 23, 1946

(Figures in thousands of barrels)

	Daily crude runs to stills	Stocks—Gasoline	Stocks—Distillate	Stocks—Residual
East Coast	797	23,373	7,532	6,446
Appalachian	150	4,018	525	583
Ill., Ind., Ky.	728	23,122	3,206	3,159
Okla., Kan., Mo.	394	10,006	1,333	1,047
Inland Texas	197	3,096	280	578
Tex. Gulf Cst.	1,135	16,014	4,456	4,370
La. Gulf Cst.	303	4,751	1,546	1,177
N. La., Ark.	58	2,002	423	216
Rocky Mtn.	113	2,314	383	666
California	720	16,013	6,214	21,048
Total 2-23-46	4,595	104,709	25,898	39,290
Total 2-16-46	4,643	105,233	27,273	40,036
Total 2-24-45	4,846	96,448	27,672	46,723

CRUDE-OIL STOCKS

(Bureau of Mines Estimate)

Week ended:	Bbl. of crude*
Feb. 23, 1946	226,699,000
Feb. 16, 1946	224,762,000
Feb. 24, 1945	219,351,000

*Excludes unrefinable Calif. stocks.

TRENDS

DAILY AVERAGE PRODUCTION FOR WEEK

	Mar. 2 crude oil	Bureau of Mines demand forecast	Feb. 23 crude oil
Alabama	1,050	500	1,050
Arkansas	77,000	76,000	77,500
California	847,650	838,000	845,100
Colorado	21,830	23,000	23,480
Eastern	61,300	61,200	63,800
Florida	100	100	100
Illinois	214,500	198,000	211,700
Indiana	18,250	13,000	17,050
Kansas	257,050	252,000	253,650
Kentucky	30,200	29,000	30,400
Louisiana	371,650	372,000	370,800
North Louisiana	82,800	.....	82,000
South Louisiana	288,850	.....	288,800
Michigan	42,800	46,000	45,290
Mississippi	55,150	52,000	52,850
Montana	21,690	20,400	21,650
Nebraska	850	800	850
New Mexico	98,450	98,000	98,300
Oklahoma	389,450	366,000	390,050
Texas	2,109,250	1,910,000	2,109,800
East Texas	321,000	.....	321,300
East Central Texas	146,200	.....	146,100
North Central Texas	157,600	.....	157,700
Texas Panhandle	81,000	.....	81,000
West Texas	503,300	.....	503,400
Southwest Texas	356,150	.....	356,200
Texas Gulf Coast	544,000	.....	544,100
Wyoming	91,250	94,000	91,330
Total United States	4,709,470	4,450,000	4,704,520
Change from previous week	up 4,950		

Total production January 1-March 2 ..... 291,412,590 bbl.
Same period last year ..... 293,583,200 bbl.

CRUDE-OIL STOCKS 226,699,000 bbl. as of Feb. 23—up 1,937,000 bbl. One year ago 219,351,000 bbl.

GASOLINE STOCKS 104,709,000 bbl. as of Feb. 23—down 524,000 bbl. One year ago 96,448 bbl.

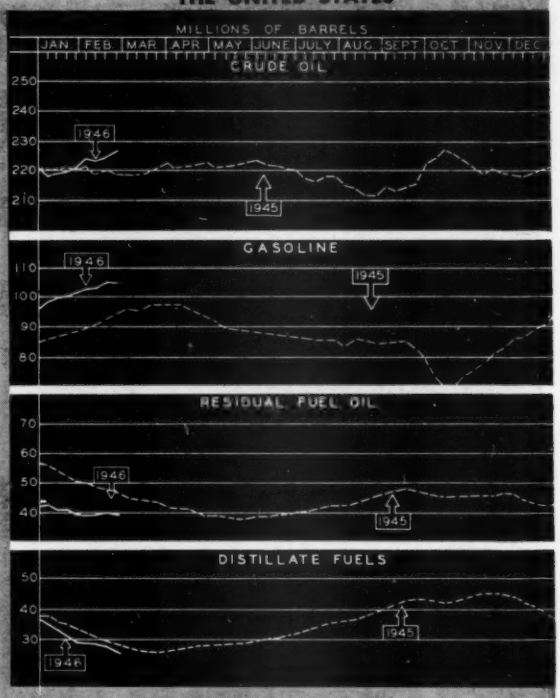
RESIDUAL FUEL-OIL STOCKS 39,290,000 bbl. as of Feb. 23—down 746,000 bbl. One year ago 46,723,000 bbl.

GAS OIL AND DISTILLATE STOCKS 25,898,000 bbl. as of Feb. 23—down 1,375,000 bbl. One year ago 27,672,000 bbl.

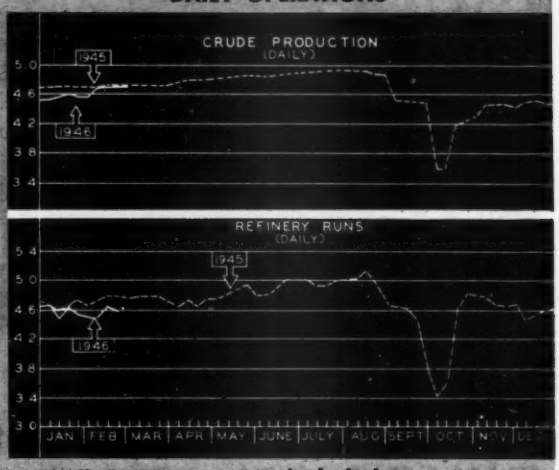
CRUDE-OIL PRODUCTION 4,709,470 bbl. as of March 2—up 4,950 bbl. One year ago 293,583,200 bbl.

REFINERY RUNS 4,595,000 bbl. daily week ended Feb. 23—down 48,000 bbl. One year ago 4,846,000 bbl.

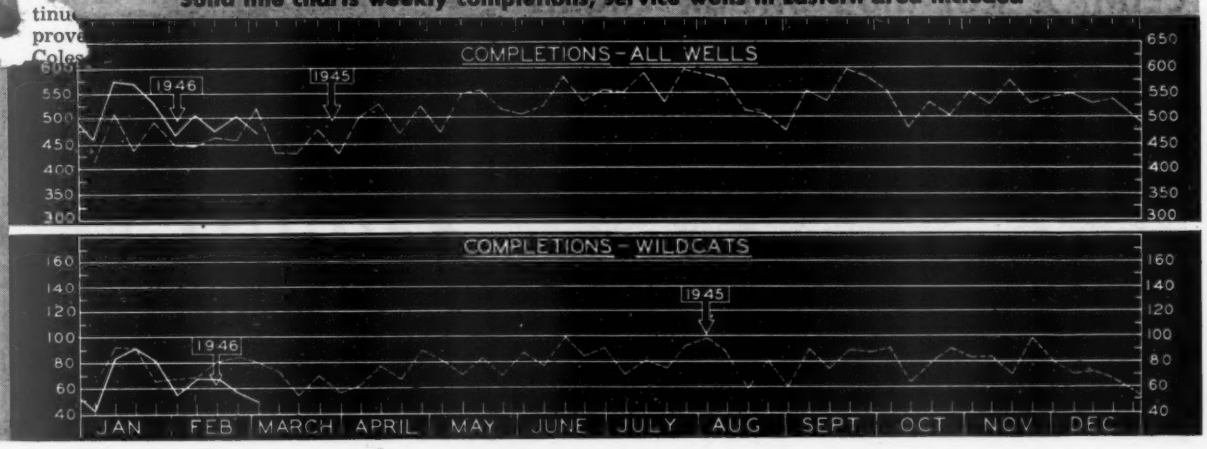
OIL STOCKS IN THE UNITED STATES

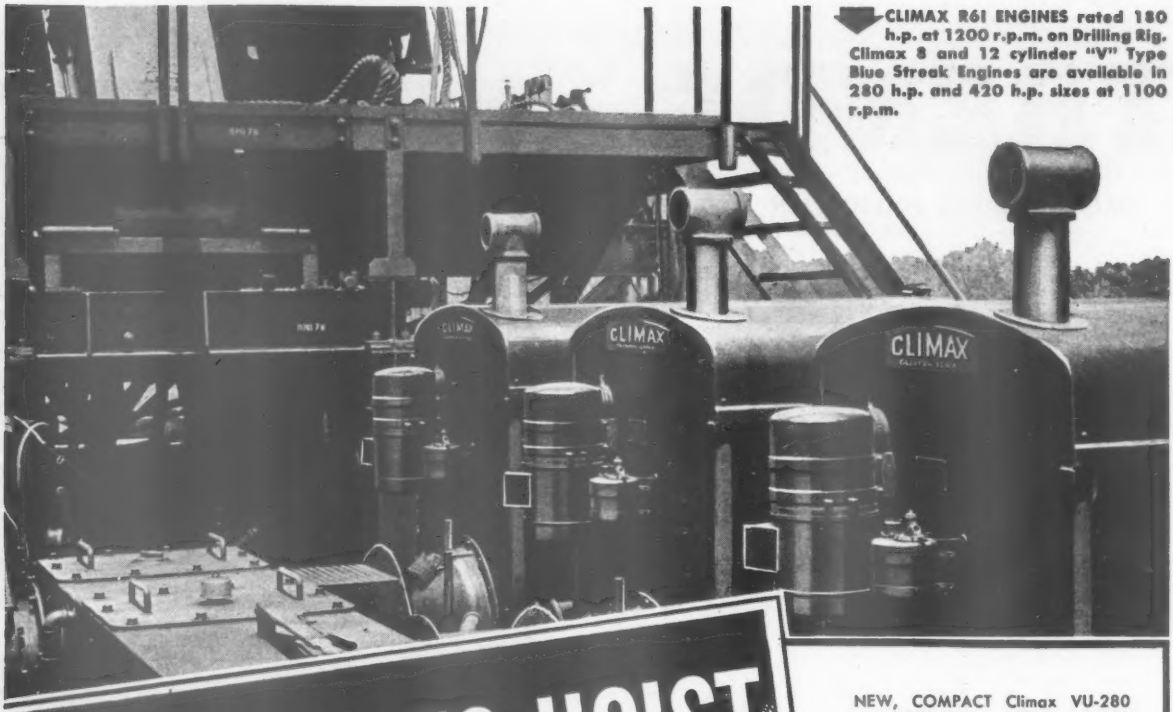


DAILY OPERATIONS



Solid line charts weekly completions, service wells in Eastern area included



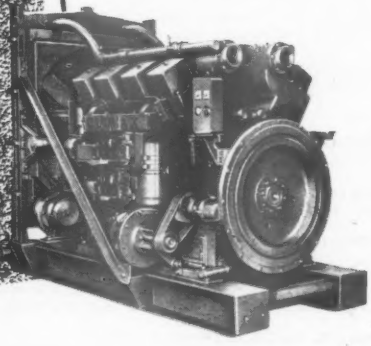


CLIMAX R6I ENGINES rated 180 h.p. at 1200 r.p.m. on Drilling Rig. Climax 8 and 12 cylinder "V" Type Blue Streak Engines are available in 280 h.p. and 420 h.p. sizes at 1100 r.p.m.

POWERED TO HOIST DRILL PIPE FAST...

and to lug through overloads!

NEW, COMPACT Climax VU-280 rated 280 h.p. at 1100 r.p.m. with radiator, fan and auxiliary equipment, 8 cylinder, 4-cycle "V" Type 60°.



You can get down FAST with this CLIMAX R6I Blue Streak Engine

SINGLE OR COMPOUNDED—here is an engine with the *extra power* to do every drilling job—to meet every drilling *emergency*—and with *ruggedness* to take the toughest kind of drill crew handling.

The Climax R6I is a smooth running, efficient, *dependable* drilling engine. It accelerates quickly. It operates economically—on natural gas, butane or gasoline. It is a *proved* engine—with years of satisfactory performance in the field

For complete specification bulletin, write Climax Engineering Company, General Offices, Clinton, Iowa. *Regional Offices: Chicago, Tulsa, New York.*

★ CLIMAX OPERATING ADVANTAGES ★

- Rapid acceleration and get-away
- Complete accessibility
- Expert field service
- Parts stocked at all active points

climax BLUE STREAK ENGINE

CLIMAX ENGINEERING COMPANY

Builder of Climax DIESELS and GENERATING SETS

MID-CONTINENT DISTRIBUTOR
The Continental Supply Company
General Offices, Dallas

CLIMAX INDUSTRIES, INC.,
901 Sinclair Building
Ft. Worth, Texas

CALIFORNIA DISTRIBUTOR
Climax Engines & Parts Company
2050 Santa Fe Ave., Los Angeles

Exploration and Drilling

Outlying Areas Show Prospects

WILDCATS in outlying areas as well as those in producing areas have been attracting considerable attention since the beginning of the present year. Several pools have been opened in remote sections and others are in prospect.

First of the rank wildcats to definitely prove the existence of an oil pool is the Utah Drilling and Development Co. 2 State, NW NW NE 16-22s-19e, Grand County, Utah. This test is located on an extension of the Salt Valley Anticline and was drilled to a total depth of 1,215 ft. After shot and acid treatment, oil rose 600 ft. in the hole and subsequent swabbing tests recovered 50 bbl. of oil in 2 days. The oil is about 38° gravity and has an unusual odor. The well is now being put on pump for more conclusive tests.

The well is located in a district that has large deposits of potash and other minerals and oil shows have been encountered in a number of tests drilled to determine the thickness and mineral content of the beds. Several of these test wells bled light oil through the valve during the drilling operations. Generally speaking, the oil shows were encountered in formations below that producing in the present discovery.

Other remotely located wildcats which have shown favorable prospects during the past week, but for which no late reports are available, are located in South Dakota, near the southern tip of Florida and near Memphis, Tennessee.

Meanwhile, important findings continue to be uncovered in the more proved areas. In the Mattoon field of Coles County, Illinois, testing of the prolific Devonian lime is under way. The National Consumers Oil Co. 3 M. B. Herkimer, SE NW NE 11-12n-7e, topped the Devonian at 3,118 ft. and is making an estimated 5,000,000 cu. ft. of gas from that formation. In earlier tests, sprays of oil were recovered. The 3 Herkimer is located on the northwest edge of the field and is the only deep test drilled in the field so far.

Two extension wells of the Rangely field in Colorado have definitely proved up a large amount of acreage and led operators to believe that the field limits may not yet be in sight. These wells are the Algord Oil Co. 1 Guiberson, SE NE 18-2n-10w, and Continental Oil Co. 1 Rooth, NW SW 15-2n-103w. The Algord well, ½ mile north of production, flowed 518 bbl. in 24 hours at 6,575 ft., total depth. Eight per cent of the fluid was salt water, and the well has been plugged back to shut off bottom water. The 1 Rooth, 1½ miles northwest of production, encountered excellent saturation from 6,581-6,805 ft., where it is believed to have encountered the water line. A plastic plug was set to shut off bottom water and after circulating oil and rigging up to swab, the well began to flow into pits, showing less than one per cent water. Testing is being continued at both of these outpost wells.

TEXAS GULF COAST

Hackberry Sand Production Found in Jefferson County

HOUSTON.—Hackberry sand production has been opened in the area known as the Northwest Hamshire field, in Jefferson County, by McCarthy Oil & Gas Corp. 3 Tyrrell Trust, in the W. C. Dunshie Survey, Section 82, 2 miles from production in the Winnie area of Chambers County. Potential flow was 217 bbl. of 39°-gravity oil daily through an 11/64-in. choke, with 1,000 lb. flowing pressure on tubing and gas-oil ratio of 1,217 to 1. Total depth is 10,789 ft., and 5½-in. casing is cemented to 10,785 ft. Production is through perforations at 10,161-69 ft. First evidence of production in this area was learned when McCarthy drilled his 1 W. C. Tyrrell Trust in Section 82, W. C. Dunshie Survey, over 2 years ago. This well was drilled to 9,525 ft., and slight shows were encountered in sand streaks between the 5,000 and 5,200-ft. levels.

The Ohio Oil Co. 1 Kirby Lumber Corp., East Cleveland area, in James McCoy League, Liberty County, is completing the connections of heating equipment, and will continue the production test which was started last week. The well perforated 63 holes in the pipe at 9,106-27 ft., ran the tubing, and was almost cleaned, flowing condensate and gas with 3,200 lb. pressure on the tubing and 3,300 lb. casing pressure, when lines started freezing. The well has been shut in for a week awaiting heating equipment to resume testing for completion. The 2-A B. E. Quinn, 1 mile northeast of the discovery, is waiting on cement to set after running 10¾-in. surface pipe to 2,323 ft.

There were 21 new locations reported this week with North Thompson field in Fort Bend County receiving 4, and 4 being wildcats, 2 in Harris and 1 each in Galveston and Waller counties. Of the 19 completions, one was a new pool opener in Jefferson County, and 4 dry wildcats, 2 in Harris, and 1 each in Jefferson and Trinity counties. Lane City field in Wharton County led with two producers completed.

UPPER GULF COAST SUCCESSFUL WILDCAT

Jefferson County New oil pool, Northwest Hamshire field—McCarthy Oil & Gas Corp. 3 Tyrrell Trust, Section 82, 4.3 mi. NW Hamshire, W. C. Dunshie Sur., top sand 10,160 ft., perforations 10,161-69 ft., first Hackberry sand production, TD 10,789 ft., PT 217 bbl. 24 hours through 11/64-in. choke, gas-oil ratio 1,217 to 1, tubing pressure 1,000 lb., gravity 39°.

UPPER GULF COAST WILDCAT FAILURES

Harris County: Jack W. Frazier 1 Greens Bayou Homesite, S. C. Hirems Sur., dry at 5,301 ft.

J. C. McKeehan 1 F. H. Liestman, Alief area, E. Pillott Sur., Block 73, dry at 8,506 ft.

Jefferson County: The Texas Co. 1 J. I. Janes, Fannett area, Manuel Chirno Sur., 4½ mi. SE of Fannett townsite, dry at 8,720 ft.

Trinity County: Magnolia Pet. 1 Oscar Gibson, Apple Springs area, C. Sanchez Sur., dry at 8,407 ft.

EASTERN TEXAS

Rusk County Test Flows Gas and Distillate

DALLAS.—Delta Drilling Co. 1 Rayford, James Smith Survey, wildcat 3 miles south of Henderson, Rusk County, flowed 10 bbl. distillate through ⅛-in. choke in 3 hours, gravity 51°, with estimated 1,000,000 cu. ft. of gas in the Travis Peak zone from 7,146-58 ft. Operator will kill and perforate casing in Pettit zone. Elevation is 390 ft. Tex-Harvey Oil Co. 1 Reitch, O. Weir Survey, Abstract 920, wildcat 10 miles northeast of Rusk, Cherokee County, ran a 150-minute drill-stem test with packer at 4,315 ft. It flowed gas and recovered 20 ft. of mud slightly cut by distillate. Operator reran tubing and the well flowed gas and estimated 50 bbl. of salt water. It will be squeezed and reperforated.

Delta 1 White, Stark Survey, Wood County wildcat 5 miles northeast of Quitman, cored from 4,832-48 ft. in the Eagleford and recovered 16 ft. of sand saturated with heavy black dead oil.

Hawkins field, Wood County, had six completions this week and Carthage field, Panola County, had two. Carthage and Hawkins fields each had six locations and East Long Lake, Anderson County, New Hope field, Franklin County, and Quitman and Manziel fields, Wood County, had one each. Hawkins field has 28 drilling wells; Carthage field 24; Pickton field, Hopkins County, and Waskom field, Harrison County, each had 5, and New Hope field, Franklin County, 4.

EASTERN TEXAS WILDCAT FAILURE

Limestone County: Woodbine Oil 1 H. W. Noel, M. R. Palacios Sur., 10 mi. SE Groesbeck, dry at 4,200 ft.

SOUTH LOUISIANA

New Production Opened In LaFourche Parish

NEW ORLEANS.—Humble Oil & Refining Co. has opened new production in the Little Temple area of LaFourche Parish, although the well is still being tested. It is the 1 Louisiana Delta Farms Co. in 19-17s-23e, and it is reported to have flowed 18 bbl. of 47°-gravity oil in 3 hours, plus 52 per cent salt water, and a gas-oil ratio of 13,000 to 1. Tubing pressure is 3,000 lb. flowing. Production is through 32 perforations at 10,587-91 ft. Total depth is 12,007 ft., and 5½-in. pipe is cemented to 10,735 ft.

In the Singer area of Beauregard Parish, Sun Oil Co. 1 Rice Land & Lumber Co., 32-4s-11w, showed only a slight gas blow through perforations at 12,435-45 ft., having no surface pressure. Perforations were squeezed, mud reconditioned and gun perforator is being run for a new test at 12,315-25 ft. Total depth is 12,662 ft. and 7-in. pipe is cemented on bottom.

Union Producing Co. 1 Belgard wildcat on the Big Island prospect in Rapides Parish, northeast of Alexandria, is coring ahead from 10,209 ft. A drill-stem test was made from 10,006-209 ft., total depth, using ¼-in. chokes. Tester was open for 5 hours, and the well showed a maximum working pressure of 350 lb., flowed the 1,500-ft. water cushion and made a small flow of salt water with some oil. Salt water was about 98 per cent, balance of the fluid being 40°-gravity light green oil. This show is in the limey sand zone above the Paluxy and operators are now coring ahead.

Only four new locations were staked in the South Louisiana district this week, the only wildcat being A. J. Bankhead and Danciger Oil & Refining Co. joint operation on the Denham Springs prospect of Livingston Parish. The other three ventures were all by The Texas Co. at East Barataria, Jefferson Parish, and in Bayou Sale field and West Cote Blanche Bay field of St. Mary Parish. Completed wells showed an increase with 14 new oil wells and 3 dry holes reported.

SOUTH LOUISIANA SUCCESSFUL WILDCAT

St. Charles Parish New oil pool, Hahnville prospect—Union Oil Co. of Calif. 1 Milliken & Farwell, 26-12s-20e, TD 9,981 ft., oil sand 8,770-86 ft., PT 25 bbl. 24 hours through 16/64-in. choke, TP 50-100 lb., gravity 39°.

SOUTH LOUISIANA WILDCAT FAILURES

Iberville Parish: A. J. Bankhead 1 Natalbany, St. Gabriel area, 19-9s-2e, dry at 9,402 ft.

Lafayette Parish: Ramon & Cockburn 1 Lafayette Parish School Board, 16-11s-5e, dry at 10,500 ft.

Protection at its best

Penn Combination Pressure and Temperature Control

PENN Engine Controls

Your engines are safe . . . with PENN Safety Controls on guard. These protective devices give you effective, low-cost protection. Minor troubles in the lubricating or cooling systems have no chance to develop into major breakdowns. For, whenever the jacket water temperature rises too high or the oil pressure fails . . . *the PENN Control goes into action* . . . sounding an alarm, flashing a warning light or, if desired, shutting down engine operation.

PENN Safety Controls are easily installed on any internal combustion engine . . . obtained on new engines, direct from the manufacturer, or quickly applied to engines now in service. They are built in three basic models: oil pressure only, water temperature only and the combination model.

Don't run the risk of seriously damaged engines . . . the loss of precious time and money! Be sure to find out about this low-cost protection today. Write *Penn Electric Switch Co., Goshen, Ind.* Export Division: 13 East 40th Street, New York 16, U. S. A. In Canada: Penn Controls, Ltd., Toronto, Ontario.

Typical Functions of PENN Safety Controls

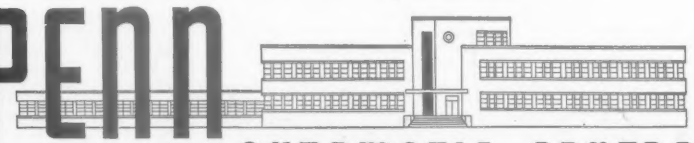
DIESEL APPLICATIONS. Sounds an alarm only . . . closes magnetic fuel valve and sounds alarm . . . closes magnetic fuel valve only . . . closes magnetic fuel valve and opens pilot relay.

BATTERY IGNITION APPLICATIONS. Opens battery circuit and sounds an alarm . . . sounds an alarm only . . . opens battery circuit only.

MAGNETO IGNITION APPLICATIONS. Sounds an alarm only . . . grounds single or dual magneto . . . grounds magneto and sounds an alarm or lights a signal light.

DUAL IGNITION APPLICATIONS. Opens battery circuit and grounds magneto.

PENN



AUTOMATIC CONTROLS

FOR HEATING, REFRIGERATION, AIR CONDITIONING, ENGINES, PUMPS AND AIR COMPRESSORS

N. CENTRAL TEXAS

Gas and Oil Shows Found In Clay County Wildcat

WICHITA FALLS.—L. T. Burns 1 Ford, Section 3221, TE&L Survey, wildcat 2 miles south and 1 mile east of Joy, Clay County, ran an 18-minute drill-stem test from 5,751-71 ft. There was gas in 14 minutes, and 600 ft. of oil-cut mud was recovered. It was drilling below 6,160 ft. in shale. This test is a northwest outpost to the Heard Ellenburger discovery. Republic Natural Gas Co. 1 Rubenkoenig, Block 1, J. Poitevent Survey, Abstract 227, 2½ miles northwest of Bryson, opens a new gas area in eastern Young County. On a 45-minute drill-stem test from 5,085-5,100 ft. in the Mississippian recovery was 950 ft. of salty gas-cut drilling mud and 22 stands of gas with bottom-hole pressure of 2,300 lb. in 10 minutes.

Denver Producing & Refining Co. 1 Jewell, Block 15, William Allen Survey, wildcat between Sherman and Gordonville, Grayson County, was drilling below 9,072 ft. in the Ellenburger which has shown considerable oil staining thus far. The test found a 75-ft. section of saturated sand and lime in the Oil Creek section of the Simpson.

KMA field, Wichita County, had five completions this week and Gatewood field, Cooke County, had three. Gatewood field, Sivell's Bend field, Cooke County, and National-Ellenburger field, Wilbarger County, each had three locations, and Burkburnett field, Wichita County, had two. Gatewood field has 15 drilling wells; Hildreth field, Montague County, 6; Sivells Bend field and Nocona field, Montague County, each 5, and National field, Wilbarger County, and Lupton and Knox fields, Young County, each 4.

In West Central Texas Shackelford County Regular field had seven completions and Jones County Regular field had four. Santa Anna field, Coleman County, Jones County Regular field and Eastland County Regular field each had one location. Stephens County Regular field had six drilling wells, Cisco field, Eastland County, three, and Loving field, Stephens County, and Reddin field, Taylor County, each two.

NORTH CENTRAL TEXAS SUCCESSFUL WILDCATS

Young County: New oil pool—Hanlon-Buchanan 1 Lena Kendall, Sec. 4, BS&FA Sur. A-1722, 3 mi. NW Eliasville, IP 315 bbl. day, perf. 3,466-81 ft., Caddo, gravity 42°, gas-oil ratio 1,800 to 1, TD 3,681 ft.

Extension to old oil pool—Lesco, Inc. 1 S. R. Jeffery, D. Brown Sur. A-16, 5½

"THE PIONEERS OF GEOCHEMISTRY"

The 1st in Business (1934)

The 1st to Advertise (1934)

The 1st in "Know How"

THE "SMITH" SYSTEM OF

GEOCHEMISTRY

IS

80% CORRECT*

The 1st "Qualitative" Pool Identification

The 1st to "Outline" Oil Pools

The 1st Company with a "School" Laboratory

Weeks of learning by the most experienced persons cannot cover the intricacies of technique in Geochemistry, (cont.) →

Why not have your Geochemical Surveys done by the Pioneers of Commercial Geochemistry? Since 1934.

→ but the fact that these students of Geochemistry, themselves, get results of 80%, or better, indicates the Efficiency of the Smith System.

*And is so *demonstrated*, day by day, in our School Laboratory, operated for the Instruction of Chemists sent from Companies that have licenses under our Patents.

A. On Reconnaissance Surveys, 8 out of every 10 prominent Oil Fields traversed are "Qualitatively" Identified, if done by experts.

B. The fact that large Oil Companies take licenses from us, and send scientists for weeks of Instruction, is evidence that the above Efficiency is not an idle boast.

C. The 80% Efficiency of the Smith System is due, not alone, to Patent data, but to our great bank of "know-how." When you purchase a Geochemical Survey you have the benefit of our vast experience in Geochemistry and the Oil Business.

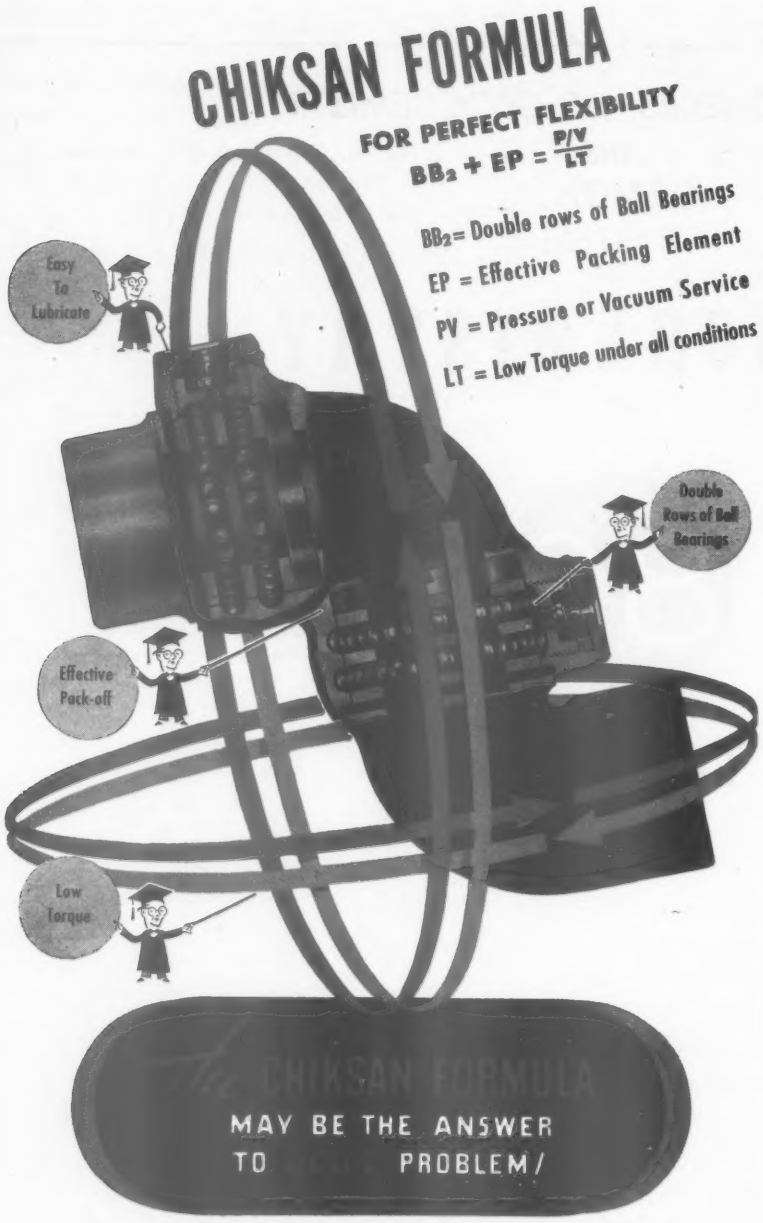
D. Many of the great developments that have been made in Geochemistry, such as "Qualitative Identification of Oil Fields," "Estimating Producing Area on Reconnaissance Traverses," "Techniques of Outlining Pools," etc., were made by this company.

Your Inquiry is Invited.

GEOPHYSICS FINDS THE STRUCTURE — COSCO — GEOCHEMISTRY FINDS THE OIL

CHEMICAL OIL SURVEY Company

MAJESTIC BUILDING — FT. WORTH, TEXAS



Chiksan flexibility is so precisely engineered that the elements which provide for easy turning and perfect seal under pressure or vacuum can be stated in a few simple symbols. This streamlined design, expressed in precision manufacture, has won world-wide acceptance for Chiksan Ball-Bearing Swivel Joints wherever movement or rotation is required in pipe lines handling liquids, vapors and gases... in aircraft... electronics ...railroads...chemical and food processing plants...refineries ...marine installations... open hearth furnaces and rolling mills... and hundreds of other applications. The new Chiksan Catalog illustrates and describes over 500 different Types, Styles and Sizes. Your Engineering Department should have a copy for ready reference.

CHIKSAN REPRESENTATIVES IN PRINCIPAL CITIES

EXPORT SALES: Chiksan Export Company, Brea, California.
Branches: NEW YORK, 7 • HOUSTON, 2

CHIKSAN TRADE MARK REG.
BALL BEARING SWIVEL JOINTS FOR ALL PURPOSES
CHIKSAN COMPANY
BREA, CALIFORNIA
NEW YORK HOUSTON

mi. N and ½ mi. E Graham, Knox pool, IP 146 bbl. day, perf. 3,904-24 ft., gravity 41°, gas-oil ratio 1,500 to 1, TD 3,924 ft.

NORTH CENTRAL TEXAS WILDCAT FAILURES

Montague County: A. V. Grant 1 Mrs. H. E. Durham, Francis Escobar Sur. A-216, 6½ mi. N and ¼ mi. E Bonita, elev. 881 ft., dry at 4,205 ft.

Throckmorton County: J. W. Carter et al 1 O. L. Kunkel, Sec. 652, TE&L Sur., 2½ mi. N Ft. Griffin, elev. 1,214 ft., dry at 720 ft.

WEST CENTRAL TEXAS WILDCAT FAILURES

Hamilton County: Seaboard Oil 1 F. D. New, A. Grimes Sur., 10 mi. NE Hamilton, elev. 1,232 ft., Ellenburger 4,190 ft., dry at 4,212 ft.

Jones County: Stanley A. Thompson 1 Mrs. Etta Whatley, Sec. 10, OAL Sur., 4¾ mi. NE Anson, elev. 1,679 ft., Swastika 2,520 ft., dry at 2,565 ft.

PERMIAN BASIN

Ellenburger Is Third Pay Zone in Martin Pool

MIDLAND.—Humble Oil & Refining Co. 2 J. E. Parker, Section 23, Block A-41, Public School Land Survey, has given the Martin pool of southern Andrews County its third pay horizon. Ellenburger was topped at 8,825 ft. On a 27-minute drill-stem test from 8,830-60 ft. it flowed at an estimated rate of 150 bbl. of 42°-gravity oil. Electrical survey is being run. Humble 1 Parker was drilled to the Ellenburger, had water and was completed in the McKee sand. Sun Oil Co. 1 Martin, discovery well in the field, was completed in the Clear Fork. Sun 2 Martin is now testing the Tubb zone and will explore the Ellenburger.

Skelly Oil Co. 1-Z University, Section 10, Block 11, University Lands, 10,000-ft. test west of the West Andrews area, Andrews County, took a 1-hour drill-stem test in the lower Permian from 6,850-6,943 ft. There was a steady blow of gas after the tool had been open 50 minutes. Recovery was 20 ft. of free oil and 185 ft. of oil and gas-cut drilling mud. It was drilling below 6,943 ft.

Stanolind 1 Veretto, Labor 7, League 72, Val Verde County School Land, wildcat 2 miles west of Levelland, Hockley County, flowed 124 bbl. of oil in 23 hours through a ½-in. choke on 2-in. tubing through perforations from 4,790-4,853 ft. Gas-oil ratio was 1,887 to 1. Stanolind 1 Mack Taylor, Section 8, Block B-2, Public School Land Survey, 1-mile east outpost to the Keystone-Ellenburger pool, Winkler County, will be plugged back to test the Devonian after showing for only a small well in the McKee section of the Simpson. The test was drilled to 10,280 ft. where it failed to find anything. It was then plugged back to 9,770 ft. to test the McKee. The latest gage showed 30 bbl. of oil in 24 hours by heads through 20/64-in. choke on 2-in. tubing.

Welch field, Dawson County; Fullerton field, Andrews County; Todd Deep field, Crockett County, and Keystone-Ellenburger field, Winkler County, each reported two completions this week. Garza field, Garza County, had 12 locations and Fullerton field and Sharon Ridge field, Scurry County, each had 4. The TXL field, Ector County, has 37 drilling wells; Keystone-Ellenburger 35, Fullerton field 28, Block 31 field, Crane County, 22, and Welch field, Dawson County, 14.

WEST TEXAS WILDCAT FAILURES

Crockett County: Magnolia 1-A Margaret Shannon Est., Sec. 24, Blk. Q, GC&SF Sur., 3½ mi. E and slightly N Shannon pool, elev. 2,575 ft., Yates 1,245 ft., San Andres 2,152 ft., dry at 2,625 ft.

Garza County: American Liberty Oil 1 D. M. Box, Sec. 8, Blk. 5, K. Aycock Sur., SW side of Garza field, elev. 2,889 ft., dry at 3,289 ft.

Honolulu-Devonian 1 J. D. Durrett, Sec. 1304, Blk. 1, ELRR Sur., elev. 2,942 ft., dry in San Andres, TD 3,616 ft.

Pecos County: G. F. Aldrich 1 State National Bank Tr., Sec. 25, Blk. 140, T&St.L. Sur., 3 mi. S Masterson pool, elev. 2,491 ft., granite 4,730 ft., dry at 4,748 ft.

SOUTHEASTERN NEW MEXICO

HOBBS. — Magnolia Petroleum Co. 10 Brunson-Argo, 9-28s-37e, ¼ mile east of production in the Brunson field, Lea County, flowed 36.45 bbl. of 39.8°-gravity oil in 30 minutes on a drill-stem test from 7,840-7,901 ft. through a 5/8-in. bottom-hole choke. Production is in the Ellenburger.

The Texas Co. 3 Blineberry, 29-22s-38e, ¼ mile north of Yeso production in the Drinkard field, Lea County, flowed 396 bbl. of oil daily from broken lime at 6,915-95 ft. The completion gage was through a 30/64-in. tubing choke. Gas-oil ratio was 2,250 to 1. Gulf Oil Corp. 1 Hugh, 21-22s-37e, 1½ miles east of Yeso production from around 6,400 ft. in the Drinkard field, flowed 50 to 60 bbl. of oil daily from the Glorietta at 5,056-5,220 ft. Gas volume was approximately 1,500,000 cu. ft. daily. The well was to drill ahead to between 6,400-6,500 ft.

Grayburg-Jackson field, Eddy County, reported two completions this week and Barger field, Eddy County, one. Paddock field, Lea County, had two locations and Grayburg-Jackson field one. Lea County has 34 drilling wells with 8 wildcats. Eddy County has 21 with 10 wildcats.

APPALACHIAN FIELD

Pennsylvania Wildcat Drilling in Onondaga

PITTSBURGH. — In Fairfield Township, Westmoreland County, southwest Pennsylvania, Peoples Natural Gas Co. topped the Onondaga lime at 7,040 ft. in the Oriskany wildcat on Camilla Giffin farm and the chert followed at 7,073 ft. From a surface elevation of 1,647 ft. the Onondaga chert is 5,426 ft. below sea level.

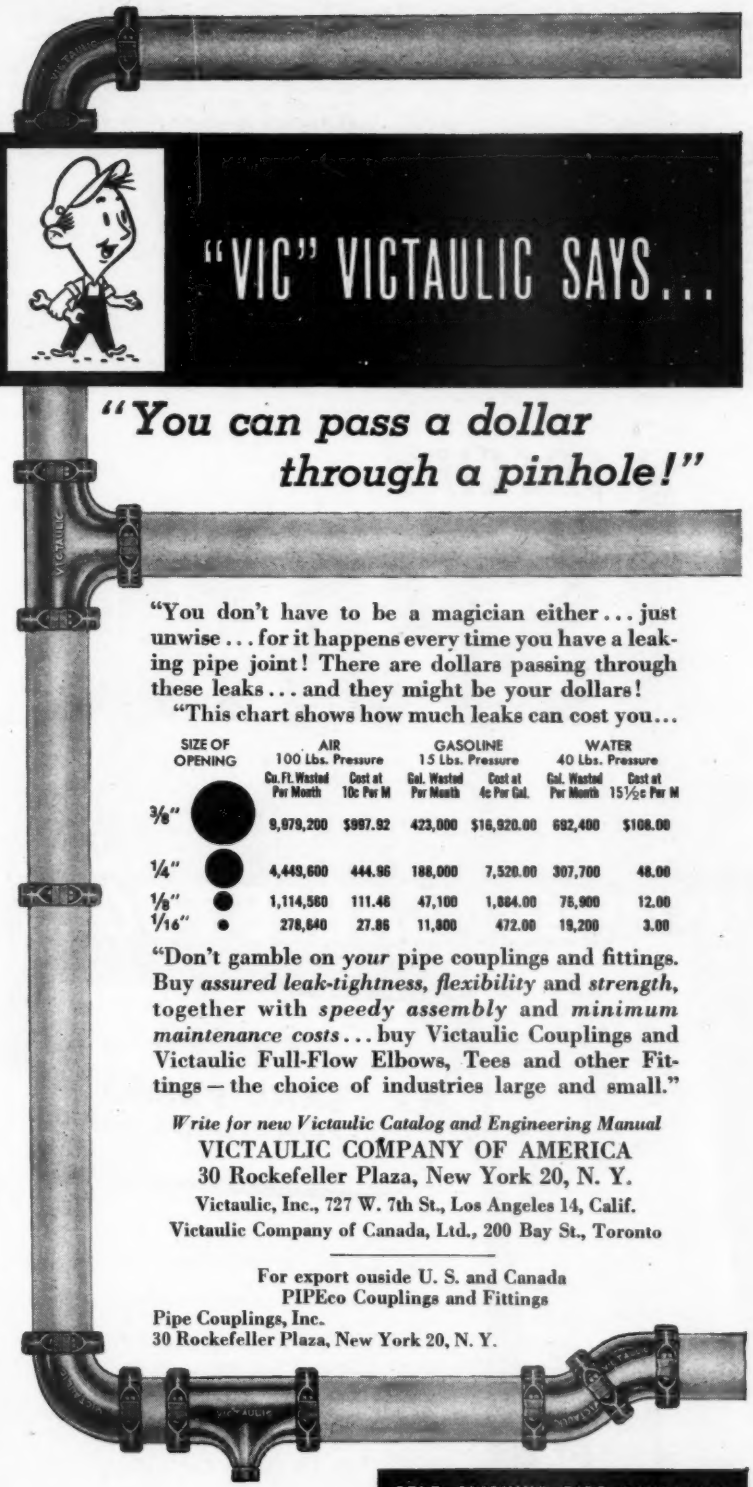
In Georges Township, Fayette County, moving with the trend on Chestnut Ridge, Manufacturers Light & Heat Co. has made a location for No. 7 Barton, 1,400 ft. southwest of No. 6 Barton. New Penn Development Co., Wm. E. Snee et al have made a location and moving in for a wildcat 6,500 ft. southwest of No. 6 Barton and on the O. R. Brownfield (now Smith) farm. It starts at a surface elevation of 2,500 ft. The No. 6 Barton is a large gas well from the Onondaga chert with the Oriskany still untested.

During the week, six new locations were announced in addition to the two deep tests in Fayette County, and located in Bethel and Kittanning townships, Armstrong County; Cumberland Township, Greene County; West Bethlehem Township, Washington County, and Beaver Township, Crawford County.

In Baileysville district, Wyoming County, West Virginia, Hope Natural Gas Co. completed another good Berea gas well in 8,984 New River & Pocahontas Consolidated Coal Co. with a final open flow of 1,836,000 cu. ft. natural. The Big Lime was placed 2,497 ft.; gas gaging 58,000 cu. ft. at 3,030-32 ft.; Injun sand 3,053-3,110 ft., and Berea 3,712-42 ft.

In Ravenswood district, Jackson County, United Fuel Gas Co. completed test 5,675 J. L. Nelson in the Oriskany sand which gaged 3,396,000 cu. ft. with the Corniferous lime at 4,835 ft.; Oriskany 4,946-98 ft. Total depth is 4,998 ft.

New locations announced totaled 10 and were scattered in Union district, Barbour


"VIC" VICTAULIC SAYS...
"You can pass a dollar through a pinhole!"
"You don't have to be a magician either... just unwise... for it happens every time you have a leaking pipe joint! There are dollars passing through these leaks... and they might be your dollars!
"This chart shows how much leaks can cost you...
SIZE OF OPENING
AIR 100 Lbs. Pressure
Cu. Ft. Wasted Per Month
Cost at 10c Per M
GASOLINE 15 Lbs. Pressure
Gal. Wasted Per Month
Cost at 4c Per Gal.
WATER 40 Lbs. Pressure
Gal. Wasted Per Month
Cost at 15½c Per M
3/8" 9,979,200 $997.92 423,000 $16,920.00 682,400 $108.00
1/4" 4,449,600 444.96 188,000 7,520.00 307,700 48.00
1/8" 1,114,560 111.46 47,100 1,884.00 76,900 12.00
1/16" 278,640 27.86 11,800 472.00 19,200 3.00
"Don't gamble on your pipe couplings and fittings. Buy assured leak-tightness, flexibility and strength, together with speedy assembly and minimum maintenance costs... buy Victaulic Couplings and Victaulic Full-Flow Elbows, Tees and other Fittings — the choice of industries large and small."
Write for new Victaulic Catalog and Engineering Manual
VICTAULIC COMPANY OF AMERICA
30 Rockefeller Plaza, New York 20, N. Y.
Victaulic, Inc., 727 W. 7th St., Los Angeles 14, Calif.
Victaulic Company of Canada, Ltd., 200 Bay St., Toronto
For export ouside U. S. and Canada
PIPEco Couplings and Fittings
Pipe Couplings, Inc.
30 Rockefeller Plaza, New York 20, N. Y.
Have you considered Victaulic for your piping requirements?
Sizes — ¾" through 60"
Copyright 1946, by Victaulic Co. of America
SELF-ALIGNING PIPE COUPLINGS
VICTAULIC
EFFICIENT FULL-FLOW FITTINGS

County; Crook district, Boone County: Buffalo district, Clay County; Ravenswood district, Jackson County; Elk and Poca districts, Kanawha County; Slab Fork district, Raleigh County, and Baileysville district, Wyoming County.

CANADIAN FIELDS

Good Well Completed in Turner Valley Extension

CHATHAM.—On the east flank of the Turner Valley north extension, Foothills Oil & Gas 23, LSD 3, 9-21-3w5, has finished with initial production of 509 bbl. from the Madison at 8,320-8,726 ft. Turner Valley operations now include two wells testing, five drilling, and three starting.

Westflank operations. — Operations at Westflank, LSD 8, 32-18-2w5, in south Turner Valley, recently shot with over 5,000 qt. of nitroglycerin, were halted owing to collapsed or parted casing at 5,700 ft. Top of the plug which has to be drilled through before full results of the shot can be determined is at 6,510 ft. The shot is reported to have affected some wells within a mile radius. Royalite 36, LSD 13-14, 32-18-2w5, increased production from 80 to 240 bbl. the day of the shot, later settling to normal. Globe 1, LSD 7, 29-18-2w5, ¾ mile southwest, showed increased gas 15 days after the shot. Gas production in a number of other wells was increased.

Kinsella.—In the Kinsella field, east-central Alberta, Imperial-Kinsella 7, LSD 7, 22-49-10w4, north of the proven area, finished at 2,025 ft. and has been abandoned. Imperial-Kinsella 6, LSD 10, 11-47-9w4, south of the field, finished at 2,039 ft. in the Viking sand, is testing with good indications of a gasser. Imperial 8, LSD 11, 22-49-11w4, is drilling, and Imperial 9 has location in LSD 6, 16-46-9w4, 7 miles south of Imperial 1 and the most southerly test yet drilled. Imperial drilling operations, which have developed a production estimated at 45,000,000 cu. ft. from six wells, have opened an area approximately 8 miles east of the field originally developed by Northwestern Utilities, Ltd. of Edmonton. Main source of gas is the Viking sand, 100 to 150 ft. above the basal Colorado at depths ranging from 2,025 to 2,375 ft. The field is believed to extend over a potential area of 400 square miles, with possible recoverable reserves of 600 billion cubic feet.

Brazeau.—Home-Brazeau 1, LSD 5, 17-43-17w5, deepest drilling test in Alberta, is at 11,552 ft., 201 ft. in the Madison, and reconditioning mud. Some porosity and fracturing of the limestone, with oil indications, have been encountered.

Ontario.—In the Mosa shallow field in Middlesex County, Ontario, northwest of Glencoe, Dominion Petroleum Co. will drill 15 wells this spring on the S. Walker and D. M. Secord farms. The company, organized in 1916, came under new management in 1937 and is now headed by A. Hufstater of Buffalo, N. Y. Some 142 wells, producing a Pennsylvania-type crude from the Onondaga limestone around 400 ft. depth, have been reconditioned to increase production.

SPECIFY
SPANG
FOR THE BEST IN CABLE TOOLS
SPANG
SAND PUMPS
(Fig. D393, Fig. D394, Fig. D395)
Fig. D393
Fig. D394
Fig. D395
Spang Sand Pumps are made in a variety of styles, three of which are illustrated. They are made with either heavy-wall or light-wall tubes, and for any desired style of connection to the cable or sand line.
For the best in Cable Tools
SPECIFY SPANG
THE HIGHER STANDARD
SPANG & CO.
BUTLER, PA.
YOUR DEALER SELLS SPANG TOOLS

MICHIGAN

Deep River Field Takes Top Rank in Production

SAGINAW.—Arenac County's Deep River oil field surged into top rank in crude production in Michigan this week as proration was lifted from 55 bbl. to 80 bbl. per well per day. Currently regulations had limited withdrawals to a total of approximately 4,000 bbl. daily.

P. J. Hoffmaster, state supervisor of wells, increased the Deep River withdrawal limitation on advice of the oil advisory board in a compromise move as operators asked for an increase to 100 bbl.

Field operations in the past week resulted in 2 small discovery wells, 3 other producers, including a near-record gusher in the Deep River field, a gas well and 6 dry holes while 15 new locations were announced.

Gratiot County's Elba township natural gas development assumed added importance as the Arthur Williams No. 1 Casler in Section 15 came in too wild for gaging. Estimates ran to 30,000,000 cu. ft. a day as the gas spewed water to a height of 150 ft., flooded surroundings and collapsed the rig under accumulated weight of ice. The Casler is a north offset to Williams 1 Long, brought in three weeks ago.

The wildcat producers appeared of slight significance. One in Monterey township, Allegan County, pumped and flowed 125 bbl. a day; the other in Arbela township, Tuscola County, was good for only 10 bbl. a day after acid treatment. In Deep River, J. E. Bauer 5 Post, Section 15, came in for 450 bbl. an hour.

MICHIGAN SUCCESSFUL WILDCATS

Allegan County, Monterey Township: W. Spencer Cook 1 David Brenner, 13-3n-13w, pumped and flowed 125 bbl. a day, natural, Traverse lime, TD 1,684 ft.

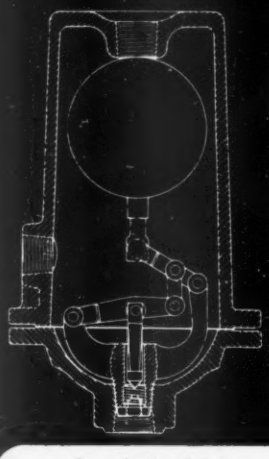
Tuscola County, Arbela Township: Fred Riddell 1 George Clark, 33-10n-7e, flowed 10 bbl., acidized in Dundee, TD 2,562 ft.

MICHIGAN WILDCAT FAILURES

Arenac County, Moffatt Township: Don Rayburn G-1 State-Moffatt, 33-20n-3e, dry in Antrim, TD 1,758 ft.

for *Clean Cut Separation* of water from gasoline

The ARMSTRONG Gasoline/Water Trap



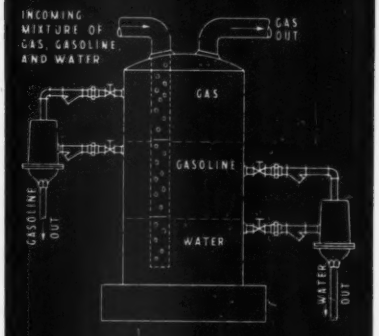
Cross Section Armstrong Gasoline/Water Trap.

ARMSTRONG Gasoline/Water Traps are used for interface service to keep the water level down to a predetermined point in any open or closed vessel in which incoming water and gasoline have a chance to settle and separate. This includes storage tanks, rundown tanks, accumulators, etc. Capacities of these traps run as high as 8000 lbs. of water per hour, continuous discharge. For complete data and prices, ask for Catalog H, 3rd Edition, which also contains valuable data on condensate drainage. ARMSTRONG MACHINE WORKS, 868 Maple St., Three Rivers, Michigan.

ARMSTRONG TRAPS

Steam Traps
Air Traps
Gasoline/Water Traps

For Refineries, Gas Pipe Lines Drilling Rigs

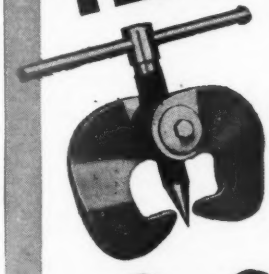


Armstrong Gasoline/Water Traps on Accumulator.

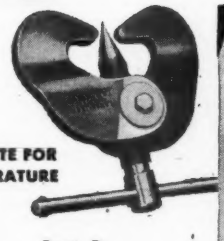
Schedule your shut-downs with

FLANGE JACKS

on any pipe line gasket replacement!



The only tool that takes the guesswork out of replacing gaskets, regardless of line pressure or location. Flanges are parted quickly and held in perfect alignment without damage to faces . . . shock and jarring of pipe lines are eliminated . . . there is no danger from flying wedges . . . no sparks caused by hammer blows. Flange-Jacks eliminate costly shutdowns, make possible fast, economical repairs in hard-to-get-at locations . . . offer maximum safety.



WRITE FOR LITERATURE

Dept. D

T. G. PERSSON COMPANY

224 GLENWOOD AVE., BLOOMFIELD, NEW JERSEY

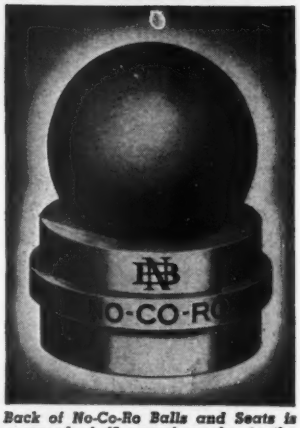
NO-CO-RO

means

Non-Corrosive!

THE BIG THING TO LOOK FOR IN OIL WELL VALVE CHECKS

Norris Brothers pioneered the use of special-analysis alloy steel for valve checks and have consistently maintained their leadership ever since. NO-CO-RO Alloy is made to our own specifications, based on countless experiments and directed to the specific job of meeting the conditions encountered in oil wells. It will not chip. It will not pit. And it will not corrode. All of which makes NO-CO-RO Balls and Seats the logical choice of operators who buy on performance and insist on lowest possible replacement and pulling costs.



Back of No-Co-Ro Balls and Seats is a record of 40 years' service to the oil industry.

Norris Brothers, INC.

ROBINSON · ILLINOIS

Crawford County, South Branch Township: McClanahan Oil Co. 1 Charles W. Starr, 30-25n-1w, dry, TD 5,215 ft.

Kalamazoo County, Alamo Township: Homer Fulton 1 W. D. & F. I. Lappin, 9-1s-12w, dry in Traverse lime, TD 1,456 ft.

SOUTHWEST TEXAS

Shallow Producing Area Opened in Bexar County

CORPUS CHRISTI.—A new shallow producing area has been opened in Bexar County by Harry S. Stahl at 1 Pablo Verjeda, in North Montaya Survey 21, 9½ miles southeast of San Antonio. Drilled to a total depth of 863 ft., this well was completed in the Basal Navarro section. The 7-in. casing was set to 835 ft., slotted liner at 830-50 ft. On potential test the well pumped an estimated 2 bbl. of 38°-gravity oil per day. Rig has been moved several hundred feet southeast for the 2 Verjeda, which is now being started.

A new gas-condensate pool has been assured by Mills Bennett 1 Martha Berger et al, wildcat 2 miles southwest of Tuleta, in Bee County. On a 40-minute drill-stem test in the Luling sand at 8,130-40 ft., recovery was 180 ft. of condensate, 2,900 lb. working pressure, with 4,500 lb. bottom-hole pressure, flowing. Operators now are perforating the entire sand section at 8,082-8,140 ft. for final completion as a new gas-condensate discovery. Total depth is 8,890 ft. Two tests made in the Wilcox failed.

Two miles northeast of production in the South Cabeza Creek field of Goliad County, Jay Simmons 1 Mary Poehler has run liner to bottom to perforate for final completion in the South Cabeza Creek pay sand. This well will extend the South Cabeza Creek 2 miles. Total depth is 8,328 ft. in the Wilcox zone.

The 31 new locations for this week included 7 wildcats, 3 in Starr, and 1 each in Live Oak, Milam, Travis and Webb counties. There were 21 completions, 12 oil wells, 1 gas, and 8 dry holes. Bee and Duval counties received the greatest number of completions with three each. One new oil pool opener was reported for Bexar County, while five wildcats were dry, one each in Bee, Bexar, Duval, Nueces and Webb counties.

SOUTHWEST TEXAS SUCCESSFUL WILDCAT

Bexar County: Rosilla Creek oil discovery Harry S. Stahl 1 Pablo Verjeda, N. Montaya Sur. 21, 9½ mi. SE of San Antonio and 2 mi. N of Eckert field, sand showing oil 845-50 ft., TD 863 ft., slotted liner 830-50 ft., PT estimated 2 bbl. per day on pump, gravity 38°, no water.

SOUTHWEST TEXAS WILDCAT FAILURES

Bee County: Sam E. Wilson, Jr. 1-A Page Est., Cadiz area, C. Rivas Sur., Abst. 280, dry at 9,003 ft.

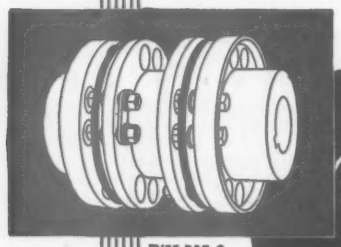
Bexar County: Harry S. Stahl 1 Ross Conaway, Rosilla Creek area, N. Montaya Sur. 21, 9½ mi. SE of San Antonio, dry at 955 ft.

Duval County: J. W. Gorman et al F. D. Lowe, AB&M Sur. 76, 16 mi. NE of Freer, dry at 3,377 ft.

Nueces County: Standard Oil Co. of Ohio 1 Mrs. Lucy Frances Cooke, Edwin R. Oliver Sur., 2 mi. W of London, dry at 8,517 ft.

Webb County: Dulaney Oil Co. 21 Bruni, Aviators area, Albercas Grant, 12 mi. S. of Mirando City, dry at 1,765 ft.

THOMAS
Flexible COUPLINGS
FOR HOT OIL PUMP DRIVES or any other service where 100% Operating Efficiency is demanded



THOMAS Flexible COUPLINGS provide for Angular and Parallel Misalignment as well as Free End Float . . . and Eliminate BACKLASH, FRICTION, WEAR and CROSS-PULL
NO LUBRICATION IS REQUIRED!

The Thomas All-Metal Coupling does not depend on springs, gears, rubber or grids to drive. All power is transmitted by direct pull.

Write for Complete Engineering Catalog!

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA

ILLINOIS

New Fields in Prospect In Two Counties

MATTOON.—Wells in both Jefferson and Effingham counties were showing as prospective discoveries at the close of the week. Gulf Refining Co. 1 Gale Knox, NE NE SE 4-3s-4e, Jefferson County, encountered excellent saturation in the Aux Vases sand at 2,898-2,923 ft., total depth. A 22-hour swab test recovered 509 bbl. of oil, and an additional 82 bbl. were recovered while the well was being cleaned out. The well is shut down at present while tanks are being erected. It is about 2 miles west of production in the Markham City field.

In Effingham County, W. L. Lichlyter 1 Schwengel, SE SE NE 36-6n-6e, is drilling ahead for the McClosky after encountering commercial-looking oil saturation in the Cypress sand. The Cypress was cored from 2,484-96 ft., and 6 ft. of saturated sand was recovered. Present depth is 2,500 ft. The 1 Schwengel is about 2 miles west of the Bible Grove field.

National Consumers Oil Co.'s Devonian well in the Mattoon field, 3 M. B. Herkimer, SE NW NE 11-12n-7e, is continuing to test that formation at a depth of 3,160-64 ft. Although no gage is available, the well is making an estimated 5,000,000 cu. ft. of gas daily.

Illinois completions during the past week totaled 30, of which 24 were oil wells and 6 were dry holes. Seven of the completions were wildcats and three of these were completed as oil wells to open new fields. First reports totaled 36, of which only 4 were wildcats.

ILLINOIS SUCCESSFUL WILDCATS

Coles County: National Consumers, Inc. 1 G. Arthur, SW NW NE 2-12n-7e, pumped 22 bbl., 65-qt. shot 1,942-62 ft., Rosiclare 1,934-44 ft., 1,951-59 ft., TD 1,976 ft., PB 1,957 ft.

B. A. Baker 1 Bates, SW NW NW 12-12n-

7e, pumped 96 bbl., 30-qt. shot 1,939 ft., Rosiclare 1,929-37 ft., 1,942-48 ft., TD 1,997 ft.

Jasper County: Pure 1 C. L. Codd, S½ SW NE 6-6n-11e, pumped 100 bbl., 5,000 gal. acid, McClosky 2,642-48 ft., TD 2,732 ft.

ILLINOIS WILDCAT FAILURES

Bond County: Dirickson & Hubbard 1 G. Casper, SW SE NE 29-4n-3w, dry at 2,513 ft., Barlow 1,045 ft., Aux Vases sand 1,140 ft., Ste. Genevieve 1,186 ft., Louisiana 1,274 ft., Devonian 2,360 ft.

Fayette County: E. J. Cunningham 1 Lansford, SE SW SW 18-5n-3e, dry at 2,185 ft., Glen Dean 1,547 ft., Hardinsburg sand 1,561 ft., Golconda 1,608 ft., Cypress sand 1,696 ft., Benoist sand 1,866 ft., Aux Vases sand 1,932 ft., Ste. Genevieve 2,006 ft., St. Louis 2,149 ft.

Hamilton County: Sohio 1 O. McMahon, SW SW SE 12-6s-7e, dry at 3,444 ft., Kincaid 2,056 ft., Menard 2,412 ft., Vienna 2,540 ft., Glen Dean 2,670 ft., Golconda 2,782 ft., Cypress sand 2,954 ft., Aux Vases sand 3,247 ft., Ste. Genevieve 3,278 ft., McClosky 3,408 ft.

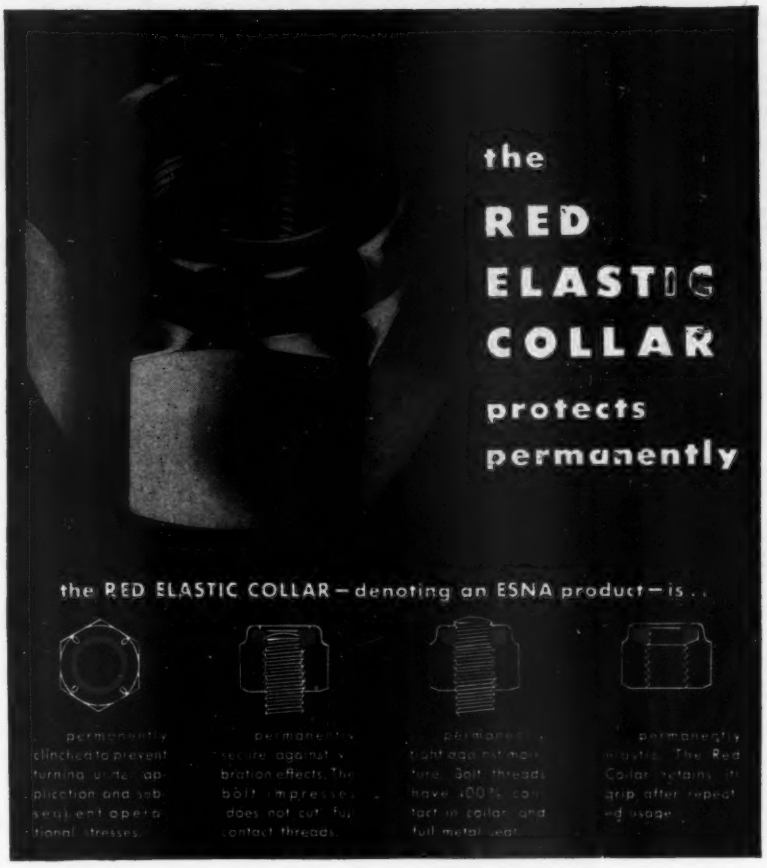
White County: B. Hackbush & Huff 1 N. A. Dasher, NW NE NE 27-4s-10e, dry at 3,144 ft., Menard 2,247 ft., Vienna 2,382 ft., Glen Dean 2,493 ft., Golconda 2,586 ft., Barlow 2,695 ft., Cypress sand 2,740 ft., Benoist sand 2,875 ft., Aux Vases sand 3,001 ft., Ste. Genevieve 3,022 ft., McClosky 3,082 ft.

CALIFORNIA

Second Producer at Bandini Completed for Large Flow

LOS ANGELES.—Richfield Oil Corp. has removed any doubt about the productivity of the Bandini district of Los Angeles Basin by completing 1 Vail flowing 1,560 bbl. of clean 35.9-gravity oil and 3,000,000 cu. ft. of natural gas per day from what will probably be termed the Vail zone. With the completion of this well, Richfield now has two producing wells at Bandini, the discovery well having been 1 Union Pacific. The Vail well is producing from a stratigraphically higher sand than the discovery although the Vail sand was cored but not produced in 1 Union Pacific. On the basis of Richfield's two producing wells, it appears quite probable that the top of the structure will be west of present production. The gas volume is of more than passing interest because, in contrast with other promising wildcats in recent years, Richfield's new well shows every evidence of the presence of an excellent accumulation. Very little data is yet available regarding Bandini although Richfield reported from time to time that new oil sands were found indicating the possibility that more than two productive zones may ultimately be found as a result of additional work. Production is coming from formations of Miocene age and Richfield appears to control all but a small part of the potentially productive acreage.

Standard Oil Co. completed two new wells in the Cymric field of Kern County this week and increased its field production 1,100 bbl. daily. Operations in this field are proceeding at a normal pace and new completions may be anticipated from time to time. Most of these new wells have high potentials but operators reduce the flow bean immediately subsequent to completion. For this reason the initials of new wells do not reflect a well's ability to produce under more favorable conditions. Standard's 71-27 Weston, a current completion, on a formation test a week or so ago flowed at a high rate and the gas volume was estimated at 10,000,000 cu. ft. Because of this large amount of gas the company blanked off the top of the oil sand and completed the well in a 15-ft. interval at the bottom of the zone, and as a result the well only showed relatively small pro-



What happens when this Red Elastic Collar becomes part of a nut? The nut becomes an ESNA Elastic Stop Nut! And it provides permanent protection for any detachable or adjustable assembly.

How?

First, an Elastic Stop Nut ***locks in position anywhere on a bolt or stud.*** Every bolt can be precisely prestressed to carry its full load. Positioning devices can be adjusted with precision. Vibration cannot disturb these settings—because the Red Elastic Collar eliminates all play between bolt and nut threads with its full contact, permanent grip.

Second, it ***prevents thread corrosion.*** Moisture is sealed out. Adjustment or removal is easy—any time.

Third, it ***prevents thread damage.*** Full thread contact in the Red Elastic Collar keeps the metal threads firmly seated. Axial play caused by vibration or stress reversal is dampened.

Fourth, it ***prevents seepage of liquids past bolt threads.*** Permits nut to be used as a sealing device.

Fifth, it ***prevents maintenance waste.*** The Red Elastic Collar, which does not injure the bolt or its plating, permits repeated usage.

Here's a challenge: Send us complete details of your toughest bolted trouble spot. We'll supply test nuts—FREE, in experimental quantities. Or, if you want further information write for literature. Elastic Stop Nut Corporation of America, Union, New Jersey. Representatives and Agents in principal cities.

ESNA

ELASTIC STOP NUTS

INTERNAL WRENCHING · ANCHOR · INSTRUMENT MOUNTING · SPLINE · CLINCH · CANG CHANNEL

PRODUCTS OF: **ELASTIC STOP NUT CORPORATION OF AMERICA**

duction as compared with some other recent completions.

Drilling operations at Buena Vista Hills have dropped off appreciably during the past 60 days but increased work at Cymric, Edison, Wilmington and a few other active fields has offset this decline. Schist zone development at Edison has shown a consistent increase during the past two months and although these wells do not require too much time from spud to completion the field total has increased. Where wells are deepened from the upper sand to the basement, completion time has been cut to about 10 days total elapsed time. Helm and Lanare in Fresno County are also showing increased work and locations staked at Poso Creek and Kern Front indicate the latter two areas will become more active. New locations announced for wildcat and proved acreage throughout the state in recent weeks have closely approximated the rate of completions leading to the conclusion that the current rate of drilling will continue at about its present level for some time to come.

CALIFORNIA SUCCESSFUL WILDCAT

Yolo County, Dunnigan Hills: **Texas** 1 Hermle, 22-11n-1w, flowed 3,030,000 cu. ft. dry gas, no oil, 24/64-in. bean, pressures 926/963 lb., s.i.p. 984 lb., TD 4,022 ft., new gas field discovery.

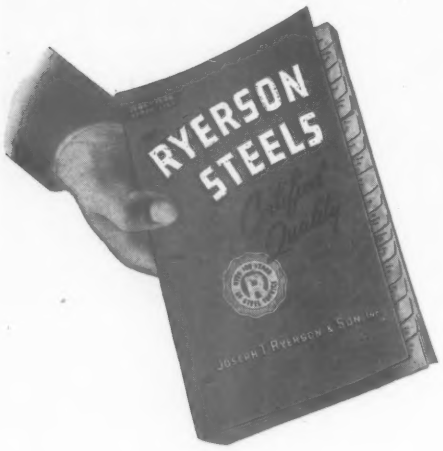
CALIFORNIA WILDCAT FAILURES

Kern County, Tejon: Crawford & Hiles 1 Tejon, 30-11n-19w, bottomed in gray sand, Chanac sand was barren except for very small amount of gas, TD 3,006 ft.

Los Angeles County, Palmdale: Del Sur Oil Co. 1 Del Sur, 26-7n-13w, bottomed in granite, hard barren gray sand cored at 2,418-2,510 ft., no important showings, TD 2,760 ft.

Whittier Heights: H. J. Farrington 1 Whittier, 22-2s-11w, bottomed in gray sand, very steep dips on bottom, no showings, TD 1,872 ft.

The Steel You Want is Here



More than 10,000 kinds, shapes and sizes of steel are described in the Ryerson Stock List and Data Book—a handy desk and pocket reference of constant practical use to purchasing executives, metallurgists, engineers, plant managers and foremen.

All the products described in the book can't always be kept in Ryerson stocks right now because of the production difficulties with which the steel industry is faced. But Ryerson stocks are the nation's largest, and continue your *best* source for the prompt delivery of steel from stock.

So contract the Ryerson Plant nearest you *first* for any steel you need. And send today for copy of the Ryerson Stock List and Data Book.

Products listed include: Bars, Plates, Sheets, Strip, Structurals, Tubing, Carbon, Alloy and Allegheny Stainless Steel. Also Inland 4-Way Floor Plate, Reinforcing Bars, Welding Rod, Babbitt, Solder, Bolts, Rivets, etc.

JOSEPH T. RYERSON & SON, INC. • Steel-Service Plants at Chicago, Milwaukee, Detroit, St. Louis, Cleveland, Cincinnati, Pittsburgh, Philadelphia, Buffalo, New York.

RYERSON

ROCKY MOUNTAIN

Colorado Wildcat to Test Prospects in Eads District

DENVER.—A wildcat in eastern Colorado which will be watched with considerable interest during the next few months is Union Oil Co. of California 1 Union Pacific, SE SE SE 17-17s-48w, Eads district, Kiowa County. It is now drilling at 3,320 ft. and has penetrated several markers which indicate that it is running higher than any of the several wells drilled in that district in recent years. This is interpreted as pointing definitely to the test being on structure and is expected upon reaching the objectives to prove or disprove the belief that an oil pool is to be found in that area. The ground elevation is 4,270 ft., and tops so far encountered are Timpas 558 ft., Codell 599 ft., Dakota 1,045 ft., Morrison 1,620 ft.

A well drilled by Standard of California in SW SW 19-16s-48w in 1926, 6 miles to the north, had the Dakota at 3,060 ft. sea level datum, or 165 ft. lower than in the Union well. Gulf Oil Corp. 1 Union Pacific-Larson, C SE NW 13-13-49, 24 miles to the north, drilled in 1938, and at one time while going down had shows for a commercial well, had the Dakota at 2,448 ft. above sea level, or 777 ft. lower than in the Union well. Gulf's 1 Union Pacific-Risser, C SW NE 1-17-50, 10 miles to the west, drilled in 1936, which had several small shows from the top of the Pennsylvanian down into the Ordovician, had the Dakota at 3,014 ft., or 211 ft. lower than the Union well. The Morgan-Flynn well 18 miles to the southeast, had the Dakota at 3,289 ft., or approximately the same elevation as the Union well.

Greasewood test deepened.—Colorado Unit Corp. 1 Kirchoff, NE NW SW 11-6n-61w, Greasewood Flats district, Weld County, northeastern Colorado, reported last week showing for a discovery at 5 ft. in the Greasewood section at 6,758 ft., total depth, was deepened 10 ft. to 6,768 ft. and is running tubing to test. The 10 ft. showed saturation in streaks all the way through, especially in the last 3 ft. at 6,675-78 ft. Swabbing intermittently before drilling, it made 20 bbl. per hour, but these tests were inconclusive as to the capacity of the well at that depth due to frequent stops on account of high wind. The corrected location puts the new well 1½ miles northwest of 1 Briggs, the nearest producer in the old Greasewood field, and the depth at which the pay was encountered indicates normal dips between the two locations.

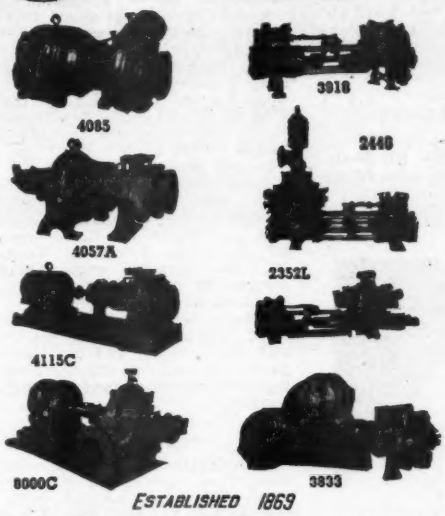
Key wells at Rangely.—The two outposts in the Rangely field in Colorado, Algord Oil Co. 1 Guiberson, C SE NE 18-2n-102w, and Continental Oil Co. 1 Rooth, C NW SW 15-2n-103w, both of which mark important extensions of the productive area, are still testing. The Algord well, ½ mile north of production, flowed 518½ bbl. in 24 hours at 6,575 ft., total depth, of which 8 per cent was salt water. It has plugged back to 6,510 ft. to shut off bottom water. The Rooth well, total depth 6,816 ft., set plastic plug at 6,805 ft. to shut off bottom water and after circulating oil and rigging up to swab, it began flowing into the pits, showing less than 1 per cent water. Last named is 1½ miles northwest of the nearest producer. It had excellent saturation from 6,581 to 6,805 ft., where it is believed to have encountered the water line. Continental has made a location for a south offset in its 2 Rooth, 760 ft. east of west line and 660 ft. north of south line SW 15-2n-103w.

New operations.—Eleven new operations

PUMPS

CENTRIFUGAL
RECIPROCATING

BUILDERS OF OUTSTANDING PUMPS
Since 1869



ESTABLISHED 1869

DEAN BROTHERS PUMPS INC.

INDIANAPOLIS IND.

323 W TENTH ST.

Specify ROCKFORD OVER-CENTER for CLUTCHES

EASY OPERATION
HIGH TORQUE
POSITIVE ENGAGEMENT
LARGE DRIVING AREA
SMOOTH RUNNING
INFREQUENT ADJUSTMENT
MINIMUM INERTIA

* The pressure plates in ROCKFORD Over-Center CLUTCHES have large area, accurately flat-ground surfaces for maximum contact with the facing material. Special alloy iron is used to withstand shock and heat strains. Provision is made for multiple driving, from the back plate. Have hardened steel bearing inserts, where the roller cams operate. Include these ROCKFORD advantages in your designs.

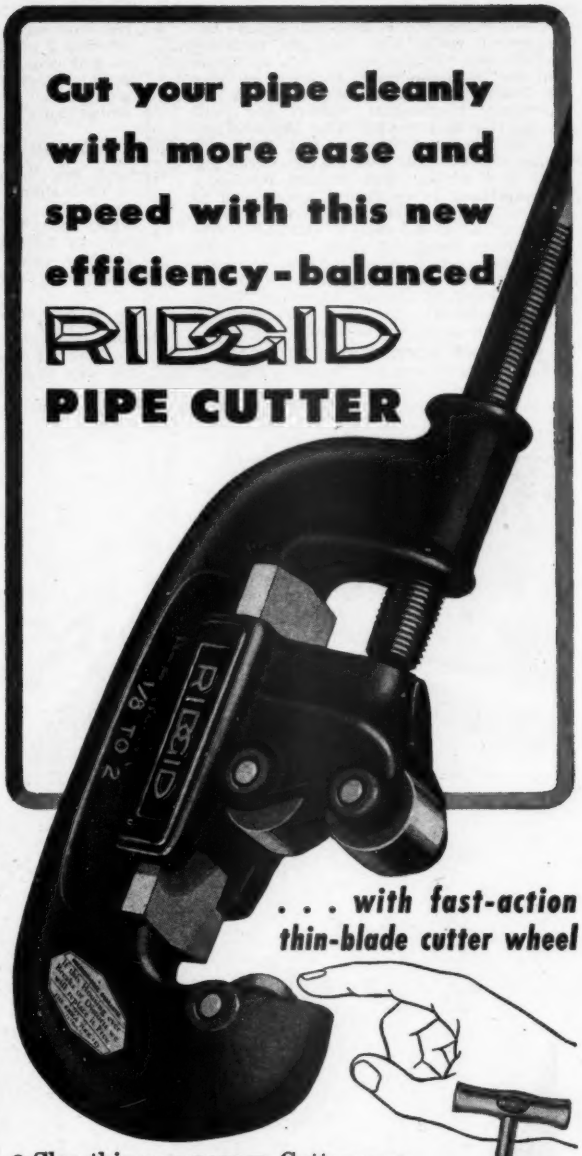
SEND FOR THIS HANDY BULLETIN ON POWER TRANSMISSION

It shows typical installations of ROCKFORD CLUTCHES and POWER TAKE-OFFS Contains diagrams of unique applications. Furnishes capacity tables, dimensions and complete specifications. Every production engineer will find help in this handy bulletin, when planning postwar products.

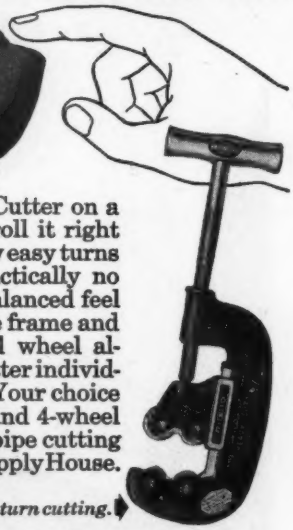
ROCKFORD CLUTCH DIVISION BORG-WARNER
1305 Eighteenth Avenue, Rockford, Illinois, U. S. A.

ROCKFORD CLUTCHES

Cut your pipe cleanly with more ease and speed with this new efficiency-balanced RIDGID PIPE CUTTER



. . . with fast-action thin-blade cutter wheel



● Slap this new RIDGID Cutter on a pipe, turn it tight and roll it right through your pipe in a few easy turns — thin wheel leaves practically no burr. You like the well-balanced feel of its new style malleable frame and the thin blade tool-steel wheel always cuts true—every cutter individually tested to assure it. Your choice of 5 sizes to 6" capacity and 4-wheel cutters to 4." For easier pipe cutting order RIDGIDs, at your Supply House.

4-wheel No. 42 for fast quarter-turn cutting.

RIDGID
WORK-SAVER PIPE TOOLS
THE RIDGE TOOL COMPANY · ELYRIA, OHIO, U. S. A.

were reported, five in Colorado, one in Wyoming, and five in Montana. All are development wells. The Colorado locations include one by Continental, two by Texas and one by Stanolind at Rangely, and one by Texas-California at Wilson Creek. In Wyoming, Continental started one well in the Big Muddy field. The Montana operations include three in Cut Bank by Union Oil Co. and two in Cat Creek by Poor Boy Oil Co. and William Hanlon.

Completions.—Completions were down to five wells, of which two were oil wells with initial production of 129 bbl., the other three being dry holes. Three of the completions were wildcats. One of these is the Sinclair-Wyoming Oil Co. 1 Dubois Unit in Fremont County, Wyoming, which is a discovery in the Embar. It swabbed 94 bbl. in 24 hours, the oil being 21° gravity.

WYOMING SUCCESSFUL WILDCAT

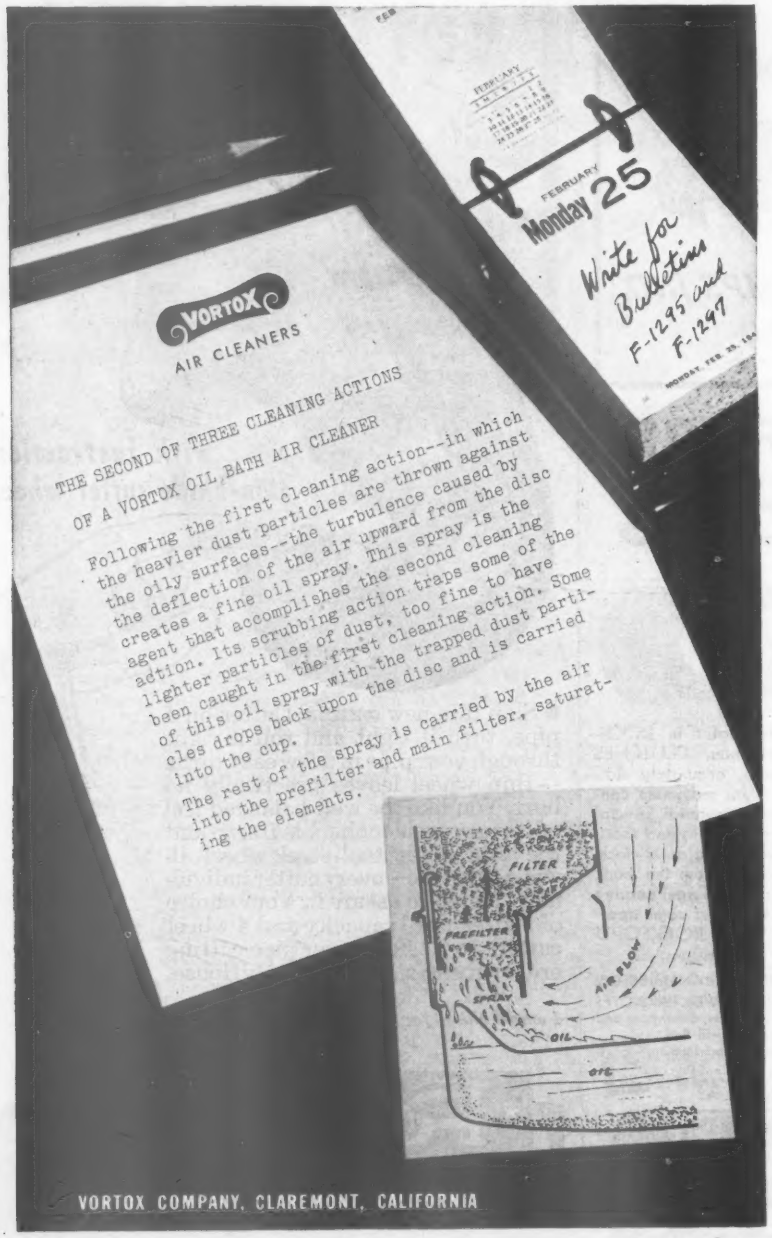
Dubois area, Fremont County: Sinclair-Wyoming Oil Co. 1 Dubois Unit, NE NE NE 11-42n-107w, TD 3,571 ft., following rebuilding of rig after fire, PB to 2,155 ft. and completed in Embar, swabbing 94 bbl. 21°-gravity black oil in 24 hours after acid, 5,000 and 10,000 gal., top Embar 2,073 ft., 7-in. 1,979 ft.

WYOMING WILDCAT FAILURE

Garland, Big Horn County: Ohio Oil Co. 13 Ohio-Kinney-Coastal Unit, NW NW 32-56n-97w, TD 4,421 ft., tested 312 bbl. water per day in Tensleep, PB and perf. in Embar at 4,195-4,270 ft., flowed 185 bbl. water in 24 hours. Outpost on northwest flank.

UTAH WILDCAT FAILURE

Mexican Hat, San Juan County: Barney Cockburn 1 Coons, SW SW NE 30-41s-19e, dry at 1,580 ft., slight show of oil.


VORTOX
AIR CLEANERS
THE SECOND OF THREE CLEANING ACTIONS
OF A VORTOX OIL BATH AIR CLEANER
Following the first cleaning action--in which the heavier dust particles are thrown against the oily surfaces--the turbulence caused by the deflection of the air upward from the disc creates a fine oil spray. This spray is the agent that accomplishes the second cleaning action. Its scrubbing action traps some of the lighter particles of dust, too fine to have been caught in the first cleaning action. Some of this oil spray with the trapped dust particles drops back upon the disc and is carried into the cup.
The rest of the spray is carried by the air into the prefilter and main filter, saturating the elements.
FEBRUARY
Monday 25
Write for Bulletins F-1295 and F-1297
FILTER
PREFILTER
SPRAY
AIR FLOW
OIL
VORTOX COMPANY, CLAREMONT, CALIFORNIA

OHIO, KENTUCKY

Muskingum County Well Has Large Gas Flow

COLUMBUS.—Wasson et al have drilled in a large gas well on Victor Wilson, Section 3, Wayne Township, Muskingum County. Clinton sand gaged 7,000,000 cu. ft. natural. North and south offsets will be drilled.

The second gas well, in four attempts, was completed in the wildcat Aurora Township, Portage County, play. Clinton sand 3,909-80 ft. had three pays totaling 200,000 cu. ft., and when shut in after shot gaged 744,000 cu. ft.

In the South Canton area, F. L. Lyons 1 Louis Shearer, Section 27, Canton Township, gaged 1,332,000 cu. ft. in the White Clinton at 4,755-75 ft. and was shut in after shot at 2,000,000 cu. ft. In North Canton, Ed Obermiller 1 Vincent Koehn, Section 32, Plain Township, gaged 1,629,000 cu. ft. natural, in Red and White Clinton sands at 4,454-4,514 ft.

Fifteen locations were reported for the week, five in Sandyville, four in Ashland, three in Stewart, and the balance of the fields one each. Cambridge field had 4 of the 14 completions and the balance were scattered.

WESTERN KENTUCKY

OWENSBORO.—Two new wildcat operations were reported in the Western Kentucky area during the past week. They are the Mitchell 1 Thornberry, 5-N-23, and the Delta-Lacy 1 Anna Lee Boswell, 7-P-26. Rotary is being rigged up at the 1 Thornberry while the 1 Boswell is still a location.

Completions for the week totaled seven, which included six oil wells and one gas well. Only new operations reported in addition to the two wildcats were three new tests in the Kasey Club field of Henderson County.

EASTERN KENTUCKY ACTIVITIES

ASHLAND.—Two gas and an oil completion were noted on the report covering activities in the eastern Kentucky field during the past week.

Kentucky-West Virginia Gas Co. completed well No. 5611 on the Alamander Caudill farm, Knott County, total depth 3,136 ft., daily open flow of 84,000 cu. ft. in shale.

Red Rock Petroleum Co. completed well No. 1 on the Jim Blanton property in Magoffin County, total depth 2,795 ft., 26,000 cu. ft.

Cumberland Petroleum Co. completed well No. 67 on the L. C. Bailey property in Magoffin County, total depth 1,026 ft., for 1 bbl.

INDIANA

EVANSVILLE.—Preparations are under way to test the Hardinsburg sand at R. E. Johnston et al 1 C. A. Barrett et al, SW NE NE 27-5s-14w, about 4 miles southwest of New Harmony, Posey County. The Hardinsburg was encountered at 2,368-78 ft., total depth, and 1-hour test recovered 140 ft. of free oil and 10 ft. of oil-cut mud, with a bottom-hole pressure of 1,050 lb. The 1 Barrett is about 1½ miles southwest of production in the New Harmony field and shows good prospects of opening a new productive area.

Five oil wells and two dry holes, one a wildcat, were completed in Indiana during the past week. Two new operations were announced in Posey County and two in Gibson County. Four drilling permits were issued for tests in 19-19n-4e, in the Trenton gas field and a few miles south in the old Horton oil field. Other drilling permits were issued for two tests in Gibson County, two in Posey County, and one in Sullivan County.

INDIANA WILDCAT FAILURE

Gibson County: J. C. Haynes and Olds Oil

Mission VALVELESS SWABS

. . . go down faster - lift a heavier load

Mission Valveless Swabs will save you time, money and materials on all your swabbing operations.

Here's why . . .

The large fluid passage made possible by the Mission split rubber principle allows the swab to fall faster — saves down trip time.

The heavy duty rubbers bring up a heavier load. There is no valve to jam or cut out. Mission rubbers will seal even if blocked open as much as one-half inch.

Mission swabs are rugged in construction and give long, efficient, trouble-free service.

On your next swabbing job, specify Mission Valveless Swabs.

DOWN TRIP

Note how the split rubber principle gives large fluid passage area. A Mission swab will fall fast, even through viscous or gas-laden fluid.

COMING OUT

The split rubbers close to effect a tight seal. Even if blocked open one-half inch, there is ample sealing area to lift a heavy load. Rugged, valveless construction assures long life and trouble-free service.

Mission MM MANUFACTURING CO.

HUMBLE ROAD HOUSTON, TEXAS

Export Office: Room 1636, 30 Rockefeller Plaza, New York 20, N. Y.

Co. 1 A. W. Warnick, NE NE SE 6-2s-10w, dry at 1,850 ft.

LA.-ARK.

Rapides Parish Test Looks Disappointing

SHREVEPORT.—A small flow of oil and salt water resulted from a drill stem test at 10,006-209 ft. in the Union Producing Co. 1 Belgard, NW 14-4n-3e, Rapides Parish. The well, a deep test in the Big Island area, is now shut down for orders, but operators may core ahead.

Pure Oil Co. is starting in Morehouse Parish, about 15 miles northeast of the Monroe field. 1 Nettie Robinson, a Smackover lime test, in NE SE 17-23n-8e, Morehouse Parish.

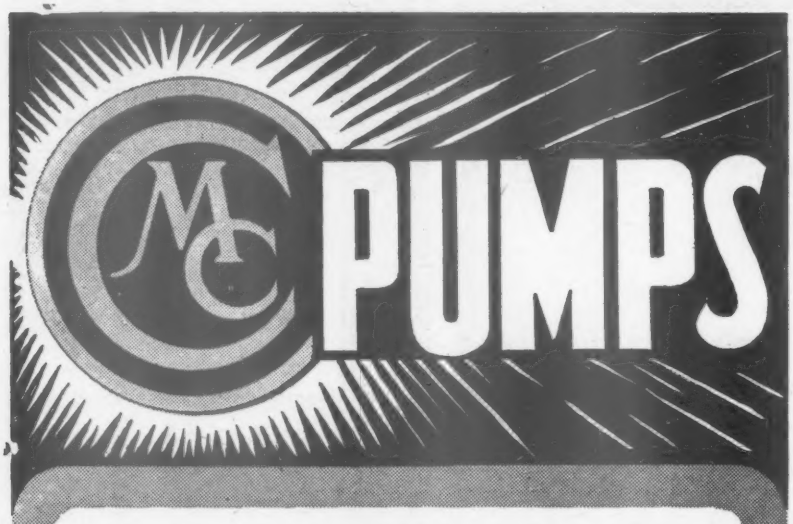
North Louisiana had 12 completions, all development wells, of which 8 produced oil, 2 gas, and 2 were dry. Big Creek had four producers, Delhi three, and Lake St. John one. Bear Creek and Ada fields each had one gas well completion. The dry holes were in East Haynesville, and DeSoto-Red River.

The C. A. Kinard 2 Finley, NW NW SW 12-17-14, Champagnolle field, Union County, Arkansas, had 2,000 ft. of fluid, half oil and half water, in the hole after perforations at 3,177-84 ft. Total depth of the well is 3,292 ft.

Arkansas had five completions of which two were oil and three were dry. Stephens had one oil and one dry. The other producer was in Wesson and one dry hole in Champagnolle. The wildcat in Boone County was dry.

ARKANSAS WILDCAT FAILURE

Boone County: William S. King 1 B. S. Lee, 660 ft. west and 160 ft. south of northeast corner of SW 24-18n-22w, dry at 708 ft.



HIGH PRESSURE CENTRIFUGAL PUMP!

3" or 4" suction . . . 1½", 2", 3" or 4" discharge. Light weight . . . only 1500 lbs. . . . easily transportable . . . mounted on heavy oil field skids. Equipped with efficient Chrysler 6-cylinder engine. Available with exhaust primer. This high pressure Unit is especially desirable where oil or water is pumped for long distances. Write for special bulletin on this CMC High Pressure Centrifugal.

Oil Field Division

CONSTRUCTION MACHINERY COMPANY

Waterloo, Iowa

Houston Office: 1506 Esperson Building

Specializing in High Pressure Centrifugals . . . Dual Prime Centrifugals . . . Diaphragm Pump and Electric Generating Plants for the Oil Field!

KANSAS

Pratt County Wildcat May Open New Field

BRIDGEPORT OIL CO. apparently has opened a new pool in Pratt County with the 1 Stoops, an old dry hole re-opened. About 4,000,000 cu. ft. of gas was gaged after a 4-hour test with 9.74 bbl. fluid per hour, of which 64 per cent was oil and the remainder sediment. The well is in SE SE SW 7-29-12w, 5 miles from the Chitwood pool. Arbuckle was topped at 4,680 ft. and Viola at 4,446 ft. Total depth is 4,731 ft. Operators are now testing.

Ashland Oil & Refining Co. 1 James, NW SW NE 36-32-2e, wildcat in Sumner County, had a show of oil at 2,656-64 ft. and is drilling ahead below 3,215 ft. Layton was topped at 2,614 ft. and the Kansas City at 2,736-32 ft.

Kansas had 24 completions of which one was a dry wildcat and 24 were field wells. One field well was gas with 14 oil and 8 dry.

KANSAS WILDCAT FAILURE

Rice County: B & R Drilling Co. 1 Scott, SW SW SW 1-20-10w, dry at 3,368 ft., Arbuckle 3,334 ft.

MISSOURI WILDCAT FAILURE

Caldwell County: O. R. Newcomer 1 Zeikle, SW NW 27-55n-29w, dry at 1,400 ft., Viola 1,380 ft., Hunton 1,197 ft.

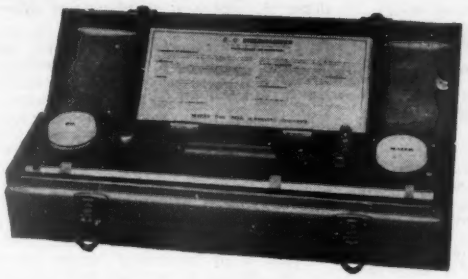
OKLAHOMA

West Marlow Pools May Be Extended to Southeast

DEEP ROCK OIL CORP. has apparently extended the West Marlow pool of Stephens County to the southeast and may have opened a new producing horizon for the pool with the 1 Dale, NE NE SE 20-2n-8w. This well encountered saturation at 7,490-7,605 ft., approximately 500 ft. deeper than the producing formation in other wells in the field. A 25-minute drill-stem test with packer set at 7,490 ft. showed gas in 4 minutes which was estimated at 10,000,000 to 12,000,000 cu. ft. A good show of distillate was also recovered. Latest reports indicated that casing is being run preliminary to making a production test.

Helmerich & Payne, Inc., 1 Sadler, SE NW NE 29-1n-2e, wildcat north of the town of Davis, is showing prospects of opening the first oil production in Murray County since the abandonment of the old Vines pool. While drilling, the 1 Sadler showed oil on the pits at 1,923-43 ft. and was perforated with three shots oppposite the Pennsylvanian sand at 1,920-22½ ft. The hole filled up 1,500 ft. with oil, but after swabbing operations began, the mud increased to 50 per cent. It was discovered that formation mud prevented the cement from rising high enough on the outside of the casing, and the present perforations are being squeezed preparatory to perforating elsewhere.

Atlantic Refining Co. et al 1 Hill, NW NW NW 25-8n-18w, wildcat discovery in Washita County, has reached contract depth of 6,505



When You Rent the
E-C
INCLINOMETER

Our rental customers receive the E-C Inclinometer in this compact carrying case. They are assured of the security and accessibility of the contents.

The E-C Inclinometer is made of K-Monel Metal, which is the highest possible grade material and lends itself to great accuracy in fabrication. The carrying case also is of K-Monel Metal sheets and N. P. brass.

SPERRY-SUN WELL SURVEYING CO.
Offices: Philadelphia, Pa.; Houston, Corpus Christi, Marshall, Odessa, Texas; Lafayette, La.; Long Beach, Bakersfield, Calif.; Oklahoma City, Okla.; Casper, Wyo.

FESCO *JEL* BENTONITE
— for MUD —

Yes, Schundler's FESCO-JEL is widely recognized by Producers and Drillers as Wyoming bentonite of high degree of purity. It is mined from extensive reserve acreages of bentonite lands by F. E. Schundler Bentonite Co., Inc., carefully graded under laboratory control, then stock-piled to provide ample supplies of crudes suitable for a variety of industrial uses. Large tonnages are also satisfactorily used by many steel foundry clients. Producer is one of the pioneers, a tonnage exporter having modern drying, milling and packing facilities. Shipping capacity, 75,000 tons annually.

F. E. SCHUNDLER & CO., INC.
530 Railroad Street, Joliet, Illinois

SCHUNDLER

Specializing In Punishment Capacity

☆ The work of a goalie on a hockey team calls for stamina and dependability. Consequently, goalies are always endowed with the most rugged physiques.

Since we confine ourselves to the manufacture of a complete line of steel chains, sprockets and flexible couplings, our specialized efforts are constantly directed toward increasing the stamina and dependability of our products. We consult with our customers in order that we may recommend the correct oil field chain for each application and later after installation, instruct them in proper lubrication practice. These are the reasons why Union Oil Field Chains frequently demonstrate an exceptional ability to withstand punishing usage.

The Union Chain and Manufacturing Company
Sandusky, Ohio, U. S. A.

Union Oil Field Chain for Every Application

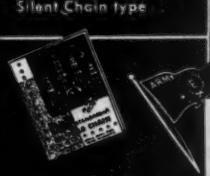
A. P. I. No. 3½ P Union *Superintendent* No. 3125-R
A. P. I. No. 3½ P Union *Superintendent* No. D-3125-R
A. P. I. No. 4 P Union *Jumbo* No. 1240-SXX
A. P. I. No. 4 P Union *Toolpusher* No. 1240-RXX
A. P. I. No. 4 P Union *Driller* No. 1240-R 4
A. P. I. No. 4 C Union *Roughneck* No. 1240-RX
A. P. I. No. 3 P Union *Toolpusher* No. 1190-RXX
A. P. I. No. 3 P Union *Driller* No. 1190-R 3
A. P. I. No. 3 C Union *Roughneck* No. 1190-RXS

★

Finished Steel Roller Chains and Sprockets
All manufacturer's standard sizes ⅛ in. to 2½ in. pitch in single and multiple strands.

Flexible Couplings
Roller Chain type
Silent Chain type

Oil Field Chain Export Sales
E. F. GAHAN
500 Fifth Ave., New York 18, N. Y.



Union Bulletin O-¹ covers Oil Field Chain. Ask for your copy.

UNION CHAINS

ft. and is running casing to complete as a dry gas well. This well tested 15,000,000 cu. ft. of gas in the Springer sand.

OKLAHOMA SUCCESSFUL WILDCATS

Lincoln County: R. L. Kemp & Gillespie 1 Brown, SW NW SE 20-16n-5e, 25 bbl. oil from Prue at 3,446-60 ft., TD 4,022 ft.

Logan County: Sinclair Prairie et al 1 Teuscher, SE SE SW 34-15n-1w, 549 bbl. oil from second Wilcox at 5,929-41 ft., TD 5,941 ft.

Major County: Superior of California 1 Manning, NE NE NW 27-22n-10w, 154 bbl. of oil, TD 8,275 ft.

OKLAHOMA WILDCAT FAILURES

Le Flore County: Le Flore 1 Wilson, center of north half of NW 35-9n-25e, dry at 2,997 ft., sand 2,846-56 ft.

Seminole County: Skelly 1 Jackson, NE NE SW 16-6n-7e, dry at 2,905 ft.

MISSISSIPPI

Test of Florida Wildcat Fails to Show Oil or Gas

JACKSON. — A 1-hour drill-stem test of O. D. Robinson 1 State, N½ N½ NW 29-59s-40e, Dade County wildcat located in Barnes Sound about 25 miles south of Miami, Florida, recovered the 3,640 ft. water cushion and 210 ft. of drilling fluid with no shows of oil or gas. Bottom hole pressure was 1,500 lb. The test was made with packer set at 10,284 ft. and using ¼-in. and ⅝-in. bottom hole chokes. This well recently attracted considerable attention when it cored an 8-ft. section of saturated lime between 10,180 and 10,250 ft. Slightly porous, oil-saturated lime sections showing spots of black oil were also cored at lower depths. The well was drilled to a total depth of 10,382 ft. where it is now shut down for orders.

Phillips Petroleum Co. 1 Davey, wildcat in Adams County, Mississippi, has been reperforated at 10,060-70 ft. with penetration still poor. Attempts to acidize failed, and mud is now being conditioned preparatory to acidizing in an effort to break through the accumulated cement resulting from numerous squeeze jobs.

MISSISSIPPI SUCCESSFUL WILDCAT

Adams County: Roeser & Pendleton 1 Baker-Maier, 38 ft. south and 2,163.8 ft. east from northwest corner of 34-6n-2w, flowed 97 bbl. oil from Tuscaloosa at 10,544-49 ft., TD 10,673 ft.

MISSISSIPPI WILDCAT FAILURES

Chickasaw County: A. W. Hutchings 1 W. C. Stone, Jr., SE SW 29-12s-5e, dry at 2,506 ft., Hartzelle 2,123 ft., Cypress 2,432-52 ft.

Lawrence County: Humble Oil & Refining Co. 1 V. L. Parkman, 2,625 ft. north and 660 ft. east of southwest corner of 8-6n-20w, dry at 8,761 ft., Midway 4,587 ft., chalk 5,495 ft.

TRY THIS GUARANTEE

IF THE MALONEY PISTON DOES NOT OUT-PERFORM ANY OTHER PISTON IN YOUR PUMPS, UNDER SIMILAR CONDITIONS, AT TEMPERATURES UP TO 250° F., THE FULL PURCHASE PRICE WILL BE REFUNDED— WITHOUT ARGUMENT.

MALONEY PISTONS use a new packing that has proved so outstandingly successful that we can guarantee that you will get:

- Longer runs between packing replacements
- Easier replacement of packing
- Longer liner life
- Better seal
- Less friction loss

You will get this better service — but even if you don't, this guarantee protects you from loss. Order some from your supply store today!

F. H. MALONEY CO.

F. H. MALONEY CO.
2301 Prairie Ave. Phone Charter 4-6961
P. O. Box 1777 Houston 1, Texas

MALONEY

PISTONS

• FOR USE IN RECIPROCATING PUMPS HANDLING—
BOILER FEED WATER • SALT WATER • GASOLINE • KEROSENE • PROPANE • SWEET OR SOUR CRUDE or any refinery liquid, so long as the temperature does not exceed 250° F.

Recovery Possibilities in North Texas Described

WICHITA FALLS, Tex.—Approximately 16,000 marginal wells in the North Texas area are suitable for water-injection methods of secondary recovery, H. C. Fowler, supervising engineer of the Bartlesville, Okla., Bureau of Mines station, told several hundred oil operators and engineers at the secondary recovery conference held here under the sponsorship of the North Texas Oil and Gas Association.

Producers were urged by Fowler to study their individual problems. "Evidence of efficient working methods discovered by another producer is useful, not conclusive," he said.

Other speakers included Ed G. Kadane, retiring association president, who said the North Texas area offers "unlimited possibilities" in secondary recovery; K. B. Nowels, petroleum engineer of Abilene, who discussed the economics of water flooding; and Richard V. Hughes, director of research of the Pennsylvania Grade Crude Oil Association, who outlined secondary-recovery work in the Bradford, Pa., field.

New 'Facts and Figures' Will Be Issued in Fall

NEW YORK. — First postwar edition of the American Petroleum Institute's "Facts and Figures" is tentatively scheduled for distribution early next fall, according to George R. Hopkins, former assistant chief of the petroleum economics division of the Bureau of Mines, who is compiling it for A.P.I.

The eighth edition of "Facts and Figures" will be the first since 1941.

Consumers Show Preference For Natural-Gas Fuel

CHICAGO. — The overwhelming preference of consumers for natural gas over coal and other types of fuel was reiterated time and again in testimony before the Federal Power Commission in the second week of its public hearing here.

Some 65 witnesses representing Michigan, Nebraska, and Wisconsin appeared before the commission. The hearing is the sixth held by the commission in its fact-finding investigation of the natural-gas industry. Previous hearings were conducted in gas-producing states in the Southwest.

Public officials, educators, labor union officials, industrialists and utility experts were among those making an appearance before the commission. The witnesses made known their opposition to further federal regulation, especially controls which might interfere with their gas supply, and their desire for extension of gas service.

The first 3 days of the week were devoted to witnesses from Michigan. Among them was Homer Ferguson, United States senator, who said he did not think there is any reason for any "pessimistic forecasts" as to exhaustion of gas reserves in the near future. The obvious interdependence of the states, vividly demonstrated during the war, he said, "should refute any arguments for the erection of trade barriers against the flow of natural gas into Michigan."

During crossexamination, the senator said he feels that Michigan should have preference over areas where coal is available and can be used in the manufacturing process.

Paul Shafer, Michigan representative, sent a letter to the commission which said there are 860,000 natural-gas customers in Michigan and that he would oppose any interstate trade barriers on the quantity of gas allowed the state or the use to which it was put. His letter was read into the record.

If gas is restricted to those Michigan industries which cannot economically use other fuels, John L. Lovett, general manager of Michigan Manufacturers Association, said they will have to either get substitutes, move their business to where gas is available, or go out of business. Lovett was emphatic in his assertion that end use should not be controlled and that quantities made available to anyone desiring to use it should not be curtailed because, he said, it is quite possible that atomic energy will replace gas as a fuel within the next 10 years.

A proposal that exhausted Michigan fields be used as gas storage reservoirs was made to the commission by Donald E. Herringshaw, general gas supervisor, Consumers Power Co., Jackson, Mich. He gave the commission a history of Michigan gas production and said present reserves are good for about 2 years longer.

Steps being taken to conserve Michigan gas was reviewed by F. R. Frye, petroleum executive of the Michigan Conservation Commission. Present reserves, he said, amount to only about 125,000,000,000 cu. ft.

"In recent years, deeper drilling has indicated the possibility of deeper gas and oil-producing zones," he said. "Widely scattered tests have had substantial showings of commercial production, but pending further development, we cannot do more than hope that these zones will prove to be substantial producers. . . .

"In some of your previous hearings, some states have advocated desire to retain their reserves of natural gas within their boundaries for the future use of their own people. In that connection, may I point out that Michigan has, for a long period of years, been an important producer of iron, copper, salt, limestone, and gypsum—all nonreplaceable mineral resources, yet it has never attempted to restrict the interstate use of them, and there is no thought of doing so now."

One of the Nebraska witnesses was C. D. Ammon, president, Cushman Motor Works, Lincoln, who, when asked if he knew whether he could get gas for an expansion program he is contemplating, answered that he would take a chance on the availability of gas rather than to use coal.

In a poll of members of the Wisconsin State Chamber of Commerce, William Petersen, executive secretary, testified, 403 of 467 who answered favored the introduction of natural gas into Wisconsin. Among the representatives of various Wisconsin communities who appeared was Elmer L. Genzmer, mayor of Mayville.

"People ask 'why can't we have natural gas,'" Genzmer testified, pointing out that they cannot understand why they should be restricted from using it when it is available to people in other parts of the country. He added that the general use of natural gas in his community, if available, would come gradually, and he compared this to the fact that when electric lights were first made available people started using them gradually as they saw the benefits.

U. S. Selling 15 Tankers; Others Offered as Scrap

WASHINGTON. — The Maritime Commission is due to open bids March 13 on 14 twin-screw and 1 single-screw dry and liquid cargo tankers recently declared surplus by the armed services.

The vessels, designated as Y-types, are capable of a speed of 9 knots. Another group of 11 tankers is being sold by the commission as scrap. Vessels in this group were built from 1914 to 1922.

Postwar construction of privately owned tankers is being resumed. Late last month, in Chester, Pa., the 18,000-ton Pawcatuck, first ship launched this year by Sun Shipbuilding Co., slid down the ways into the Delaware River. It was an oil tanker.

Tanker Docks With 179,700-Bbl. Oil Cargo

NEW YORK.—H. A. Hassan, manager of marine sales, Sinclair Refining Co., states that the largest single cargo of any kind to discharge at an American port occurred when the tanker Phoenix docked December 23 at Marcus Hook with 179,700 bbl., or more than 24,260 tons of crude. The cargo was shipped from Sinclair fields in Puerto la Cruz in Venezuela to Sinclair's refinery here.

NEED NEW

BOOMERS for your OIL FIELD HAULING?

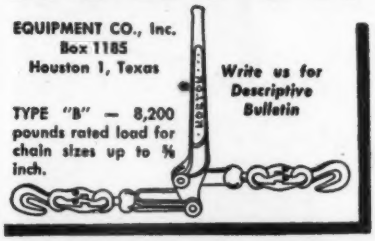
You can get them now! Norton Type "B" and Type "J" drop forged, heat treated steel Load Binders (Boomers) are ready for immediate delivery. Order them through your jobber.

NORTON

EQUIPMENT CO., Inc.
Box 1185
Houston 1, Texas

Write us for Descriptive Bulletin

TYPE "B" — 8,200 pounds rated load for chain sizes up to ⅝ inch.



YOUR CATERPILLAR DISTRIBUTOR
In The Heart Of The
MID-CONTINENT

Caterpillar Diesel and Natural Gas Engines, Electric Sets, Tractors and Road Machinery

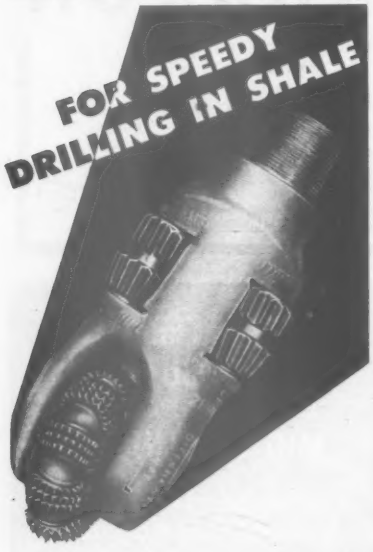
SOUTHWEST MACHINERY CO.
Oklahoma City, Tulsa, Hobart, Woodward, McAlester

The Multi-range lightweight BJ Type "T" Tong for Drilling or Production Rigs

Designed to lighten and speed up the job of running tubing, BJ type "T" tongs are equally valuable in "nippling up" or as lay tongs. Made in five series: A, B, C, D, and E, with available jaws in each series to handle API tubing and coupling sizes from 1" to 4", plain or upset.

Change in size of tong jaws can be made quickly and easily. The dies are self sharpening and provide a quick, positive, non-crushing grip. The handle is made of reinforced seamless tubing, and is designed to provide sturdy, balanced construction. Stabbed on, these tongs cannot come open even if hinge pin fails, yet jaws easily release by pulling back on the sleeve. Call your BJ supplier and let him equip your rigs with "T" tongs.

BYRON JACKSON CO.
Houston • LOS ANGELES • New York



ZUBLIN DIFFERENTIAL BITS

Where drilling speeds are essential the Differential Bit affords speedy, safe drilling with plenty of cutting action at bottom of hole. Bulletins and prices upon request.

UNIVERSAL ENGINEERING CO.
OFFICE AND FACTORY
2369 EAST 51st ST. • LOS ANGELES 11, CALIFORNIA
BRANCHES: HOUSTON, TEXAS • LAKE CHARLES, LA.
BAKERSFIELD, VENTURA AND AVENAL, CALIFORNIA

Among the

Drilling Contractors

Andrew S. Hoyt Drilling Co. has been contracted by Arthur H. Boeve to drill the 1 Albert & Vernon Hinz, SW SE NE 35-1n-16w, Casco field, Allegan County, Michigan.

Boyle Brothers have secured an important exploratory drilling contract for Hay River Exploration Syndicate in the Hay River area in the Canadian Northwest Territories, near the west end of Great Slave Lake. The company sponsoring the drilling is backed by mining interests in the Yellowknife area, including Ventures, Ltd., Frobisher Exploration, Giant Yellowknife, Negus Mines and R. J. Jowsey, and will test the oil possibilities of a 10-sq.-mile reservation granted by the Dominion Government to T. Boyd Kyle. Geological work has already been done, drilling camp constructed and supplies and equipment moved in; and initial hole should be under way by March 16. Contract calls for four test holes to be carried to the upper and middle Devonian contact around 400 ft. to test structural conditions to be followed by two deep tests to the Silurian at around 1,000 ft. Wells are to be drilled with 3-in. diamond drill using rotary mud; if successful rotary drilling will be undertaken later. Drilling program is to cost around $32,000, with $15,000 other costs. Location of the preliminary drilling is a few miles south of Hay River Fort.

Fisher-McCall Oil & Gas Co., Inc. has been contracted by W. D. Gannett to drill the 1 Kirk Deal in SW SW SW 29-1s-12w, Alamo field, Kalamazoo County, Michigan.

Because of recent transfers of some members of its California staff, **Rocky Mountain Drilling Co.** announces that H. L. Roberts will make his headquarters at Saugus and L. S. Ostrander will be at Taft in the Midway-Sunset area of California. L. K. Harder will be at Montebello and J. B. Nelson is operating as company representative at Riverdale in Fresno County.

Frank W. Potts & Son will drill the Harold W. Scofield 1 Harold W. Scofield, a wildcat, in SE SE SW 31-3n-5e, Livingston County, Michigan.

Drilling & Exploration Co. recently shipped drilling equipment to Paraguay where the company will drill a contract well for Union Oil Co. Location has been tentatively made but Union has until July 1, 1946, to begin actual drilling in conformance with provisions of its contract with the Paraguayan Government. Drilling & Exploration Co. recently sent several men from Los Angeles to arrange details and to assist others who are already on the ground. The projected Chaco well of Union is located in rough country and while military roads will be used as far as possible, the geographical position of Paraguay with no coast line except free ports in other countries makes the undertaking a costly one and planning calls for careful work.

H. L. Behm Drilling Co. has been awarded the contract to drill four wells in Hamilton County, Indiana, for Cline & Sperry Oil Co. The wells

YOU SAVE TIME ALL THE TIME WITH Young DRILLING ENGINES

Because of their unit construction and skid base mounting, you can move a YOUNG Drilling Engine with minimum trouble and do it quickly. When you get it on location, those same advantages help speed your set-up. No elaborate foundation is required. From then on your savings in time begin to pile up. No gears to shift—instant reverse with a single movement of the control lever. Brake sets automatically when clutch is disengaged. Ample power for fast pulling-out. On jobs where time is money, the time you save each day with a YOUNG Drilling Engine really counts.

DISTRIBUTORS: A. E. Avers, Box 606, Tulsa, Okla. Iverson Tool Co., Texas, Artesia, New Mexico Branchland Pipe & Supply Co., Huntington, W. Va. Connelly Machy. Co., Billings & Great Falls, Mont.

OTHER YOUNG PRODUCTS
Natural Gas Carburetors • Orifice Gas Well Testers
Under-Road Boring Machines • Electric Light Plants

YOUNG ENGINES MAKE YOUR DRILLING DOLLARS GO DEEPER

USE 'BESTOLIFE IT'S BETTER

'BESTOLIFE — the Lead Seal Joint Compound used successfully in the Drilling and Refining Industries for years — is immediately available through more than 100 distributors in the U.S.A. Your nearest supply house field store probably has 'BESTOLIFE in stock for immediate delivery. Use 'BESTOLIFE — it's BETTER!

EXPORT: THE NATIONAL SUPPLY CORP., 30 ROCKEFELLER PLAZA, NEW YORK

I. H. GRANCELL
1601 EAST NADEAU STREET
LOS ANGELES 1, CALIFORNIA

DAWSON & CORBETT

Pipe Stringing

I. C. C. Authority — heavy hauling — Colorado, Wyoming, Montana, North and South Dakota. Pipe lining — building & construction — derrick skidding. Trucks — tractors — trenchers and welders.

Baroid products in stock at Riverton and Rawlins, Wyoming, and Craig, Colorado.

DAWSON & CORBETT
RAWLINS • Box 288 • WYOMING

are: 1 Elwood Tomlinson, 1,000 ft. from the north line and 400 ft. from the south line of NE SE 19-19n-4e; 2 Elwood Tomlinson, 400 ft. from the north line and 400 ft. from the east line of NE SE 19-19n-42; 3 Elwood Tomlinson, 400 ft. from the south line and 400 ft. from the east line SE NE; 4 Elwood Tomlinson, 900 ft. from the south line and 350 ft. from the east line of SE NE 19-19n-4e.

James Collins Drilling Co. will drill the Fred Riddell 1 Lurvey-Clark, NW SE NW 33-10n-7e, Arbela field, Tuscola County, Michigan.

Delta Drilling Co. will drill the R. E. Johnston & John Clay 1 Elmer E. Elliott, in NW SW 23-5s-14w, Posey County, Indiana.

Charles Wildermuth Drilling Co. has the contract to drill the McClure Drilling Co. 1 E. Wicks, wildcat, in SW NE NW 36-11n-6w, Montcalm County, Michigan.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, General Land Office, Washington, 25, D. C. Notice is hereby given that sealed bids will be received until noon on Monday, March 25, 1946, for lands described herein situated within the known geologic structure of the North and South Oregon Basin oil and gas fields, Wyoming. This land is offerred to qualified bidders of the highest cash amounts per acre as a bonus for the privilege of leasing the land under section 17 of the mineral leasing act as amended by the act of August 21, 1935 (49 Stat. 674, 30 U. S. C. sec. 226) in the following parcels: North Oregon Basin field—Parcel No. 1, T. 52 N., R. 100 W., sec. 30, W½E½, 160 acres. Parcel No. 2, T. 51 N., R. 100 W., sec. 9, W½ of lot 1, NW¼SW¼, 52.02 acres. Parcel No. 3, T. 51 N., R. 100 W., sec. 17, S½NW¼, 80 acres. South Oregon Basin field —Parcel No. 4, T. 51 N., R. 100 W., sec. 17, lot 3, SW¼SE¼, 84.31 acres. Parcel No. 5, T. 51 N., R. 100 W., sec. 19, lot 4, SW¼NE¼, E½SW¼, W½SE¼, 235.87 acres. Parcel No. 6, T. 50 N., R. 101 W., sec. 1, lot 1; T. 51 N., R. 101 W., sec. 36, lots 2, 3, SE¼SE¼, 169.83 acres. Total—782.03 acres. A stipulation for the protection of the Shoshone Reclamation Project, a copy of which may be obtained from the local office at Cheyenne, Wyoming, or the General Land Office, Washington, 25, D. C., will be made a part of any lease covering the W½E½ sec. 30. Bids must be submitted on each parcel separately; but if two or more parcels in the same field are awarded to the same bidder, they may be combined in a single lease. Each bidder must submit with the bid one-fifth of the amount bid in cash, or by certified check made payable to the order of the Treasurer of the United States, and file the showing of qualifications to receive a lease required under 43 CFR 192.19. The envelopes should be plainly marked, "Bid for Parcel No.—, North and South Oregon Basin oil and gas fields. Not to be opened before noon, Monday, March 25, 1946." No bids received after the hour fixed herein for submitting bids will be considered. The remainder of the bonus bid and the annual rental at the rate of $1 per acre must be paid and a $5,000 corporate surety bond must be furnished by a successful bidder prior to the issuance of a lease. The deposits of the other bidders will be returned upon acceptance of the successful bids by the Secretary of the Interior. The successful bidder will be required to agree not to discriminate against any employee or applicant for employment because of race, creed, color, or national origin and to require an identical provision to be included in all subcontracts. Bidders are warned against violation of section 59, U. S. Criminal Code, approved March 4, 1909, prohibiting unlawful combination or intimidation of bidders. The right is reserved to reject any and all bids in the discretion of the Secretary of the Interior. Fred W. Johnson, Commissioner.

DIRT WON'T BURN! *Why put it in your engine?*

SECO GAS-KLEEN SCRUBBER TANK

This SECO GAS-KLEEN SCRUBBER and VOLUME TANK will remove all dirt, grit, oil and water from field gas, and will also provide an even flow of gas to the engine carburetor. Prolong engine service life—reduce maintenance costs and "down time" by using a SECO SCRUBBER.

For bulletin and prices write

SHRIMPTON EQUIPMENT CO.
757 Subway Terminal Bldg.
Los Angeles 13, Calif.
Branches
Houston, Texas • Tulsa, Okla.

"Best Bet Yet"

These oil-proof, wear-resistant, plastic tubing protectors are an integral part of the tubing collar. Made in all sizes, they prevent the metal-to-metal contact that has caused many expensive "wet" jobs in pumping wells in the past.

PATTERSON-BALLAGH TUBING PROTECTORS
LOS ANGELES 1 • HOUSTON 10 • NEW YORK 6

PERSONALS

Ohio Oil's Pipe Line Head Started With Company in 1909

O F. MOORE, who succeeds Charles Bunje, Jr., as vice president and manager of the pipe line department of Ohio Oil Co., has been connected with the company for 37 years. A native of Indiana, he attended Brown's Business College at Terre Haute and after a short period devoted to real estate joined the Ohio company at Robinson, Ill., in the cashier's office in November 1909. In May 1913 he was transferred to Findlay and served in various capacities in the stock transfer, leasehold, right-of-way, and executive departments.

Three years later, Moore became assistant secretary of Illinois Pipe Line Co. and subsequently he was elected a director and secretary. In April 1938 he became vice president and held that position until the company was dissolved in December 1942. At that time he became assistant secretary of Ohio Oil Co. and vice president and secretary of Illinois Pipe Line Co. of Texas. In May 1944 he was made assistant manager of the pipe line department of Ohio Oil Co. His latest advancement came with Bunje's retirement.

S. A. Montgomery, manager of the Whiting, Ind., refinery of Standard Oil Co. (Indiana), has been promoted effective March 11 to assistant general manager of manufacturing in the Chicago general office. **Dr. W. J. McGill,** manager of the company's Wood River, Ill., refinery, who originally joined Indiana Standard at Whiting, will take over management of the Whiting refinery. Two other personnel changes resulting from the move involve **Dr. G. F. Ordeman,** assistant general superintendent at Whiting, who will succeed Dr. McGill; and **A. F. Endres,** light oils division superintendent at Whiting, who will succeed Dr. Ordeman.

Dr. J. M. Pearson is the new manager and director of Sun Oil Co.'s physical research and development laboratory for which temporary quarters have been established at Upland, Pa. **Birney K. Morse,** who returned to the company last December from service as an Army colonel in India, has been named to succeed Dr. Pearson as general pipe line manager in charge of operations for Susquehanna Pipe Line Co., Middlesex Pipe Line Co., Sun Oil Line Co., and Sun Pipe Line, Inc. The physical research and development laboratory is a new activity of Sun's production department. Assisting Dr. Pearson as manager and director will be **F. L. Johnson,** who left the company's production department during the war to become head of the torpedo division at the Navy's Ordnance Laboratory in Washington, D. C.

E. T. Heck has taken charge of a broadened program of oil and gas investigations for the New York State Geological Survey. Formerly with the West Virginia Geological Survey, Heck will supervise the additional new investigations which are to commence in the near future under reorganization plans of the New York survey.

Campbell Osborn, formerly an independent operator and previously head of the economics department of the Marland Oil Co., is now engaged in consulting work with offices in the Woodward Building, Washington, D. C. During the war, he was connected with the War Production Board.

A. T. Rylands, engineer with Shell Oil Co., Inc., has been transferred from Tulsa to Oklahoma City.

Lionel W. Wiedey has been appointed general manager of Tropical Oil Co. in Bogota, Colombia, succeeding **L. P. Maier. Paul R. Ratliff** has been transferred from El Centro and is now assistant general manager with headquarters in Bogota.

F. B. Haverfield has been made manager of the natural gasoline and gas division of Continental Oil Co., succeeding **R. A. Carter,** who resigned to join the manufacturing department of Stanolind Oil & Gas Co. Haverfield was made assistant superintendent of the gasoline department in 1938, becoming assistant manager 4 years later. He will be succeeded by **D. B. Edwards,** assistant to the manager of the department since 1943.

F. B. HAVERFIELD

J. H. Field, Sohio Petroleum Co., has been elected president of the Oklahoma Society of Petroleum Engineers. Other officers named at an organization meeting in Oklahoma City are **Glenn M. Stearns,** engineer in charge of the West Edmond Field Engineering Association, vice president; **Fred Carroll,** Shell Oil Co., Inc., secretary, and **T. E. Ockershauser,** Shell Oil Co., Inc., treasurer.

Dr. Arturo Hidalgo, petroleum engineer for the Venezuelan Government, is touring the southwestern states studying conservation methods following completion of special studies at Tulsa University.

Max Thornburg, formerly adviser to the State Department on foreign oil matters and previously an official of American Arabian Oil Co., and **D. R. Knowlton,** head of foreign operations for Phillips Petroleum Co., were recent visitors in Bogota, Colombia.

Jorge Perry, A. Lobo-Guerrero, and **E. Ospina-Racines** have been named to organize an oil committee of the Sociedad Colombiana de Ingenieros. The society acts as a technical consulting body to the government.

Samuel Butler, vice president for petroleum of Sharples Corp., has taken charge of the petroleum division's main office which has been opened in Denver. **Samuel Butler, Jr.,**

is manager of the office; **David M. Evans,** formerly assbciated with Honolulu Oil Corp., at Midland, Tex., heads the geological department; **Ralph S. Cooley,** formerly with Sloan & Zook Co. of Midland, Tex., and George P. Livermore, Inc., Lubbock, is in charge of the land department; and **Edward M. Wheeler,** formerly with Signal Oil & Gas Co., is head of the engineering department.

William H. Pinckard, president of Bahrein Petroleum Co. and of the California-Texas Oil Co., left New York recently on a 3-month tour of Caltex and Bahrein properties in the Middle East.

Edward V. O'Rourke, professor of petroleum engineering at Ohio State University, has been prevented by illness from taking a new teaching assignment at Marietta. He will remain at Ohio State.

MacLean Houston, production manager of the United Refining Co., Warren, Pa., has been reelected chairman of the technical advisory committee of the Pennsylvania Grade Crude Oil Association.

Howard Q. Daguid, who has been acting engineer at Shell Oil Co., Inc.'s Cactus plant, has been advanced to senior technologist and transferred to the company's headquarters in San Francisco.

Carlton Beal, Los Angeles, consulting petroleum engineer and geologist; **Larry W. Chasteen,** Union Oil Co., petroleum engineer; **Walker S. Clute** and **W. H. Geis,** consulting engineers, and **S. P. Lindau,** Western Precipitation Co., mining engineer, have been elected members of the executive committee of the Southern California section of A.I.M.E.

N. B. Rogerson, Cannar Oils, Ltd., has been appointed to succeed **J. M. Penny** as manager of development work in the Vermilion field in eastern Alberta. Penny has resigned and will return to England.

Roger S. Williams, now with Standard Vacuum Oil Co. in New York and manager of the company's Korean branch prior to the war, and **J. M. Hansen,** assistant general manager of The Texas Co. (China) Ltd., have been appointed officers of the newly-created Korean - American Chamber of Commerce.

H. M. Hohmann, exécutive of N. V. De Bataafsche Petroleum Maatschappij, from The Hague, Holland, now in Southern California, is spending several months in the United States covering major producing areas and reestablishing contacts severed when he was caught in the Nazi occupation of his homeland.

When Time Means Money

AIR EXPRESS EARNS ITS WEIGHT IN GOLD

22% slash in rates since 1943 makes this fastest delivery service a better business buy than ever
Do you need something fast — to keep your business going and men at work, to serve a customer or to get one? Do you need "delivery speed" on new merchandise or sales pieces to keep a customer happy? Then use Air Express. Let its speed save time (a matter of hours from coast-to-coast). And the time you save means money — money that makes this fastest delivery service "earn its weight in gold!"
HERE'S HOW LITTLE IT COSTS (U. S. A.)
AIR MILES | 2 lbs. | 5 lbs. | 25 lbs. | 40 lbs. | Over 40 lbs. Cents per lb.
149 | $1.00 | $1.00 | $1.00 | $1.23 | 3.07
349 | 1.02 | 1.18 | 2.30 | 3.68 | 9.21
549 | 1.07 | 1.42 | 3.84 | 6.14 | 15.35
1049 | 1.17 | 1.98 | 7.68 | 12.28 | 30.70
2349 | 1.45 | 3.53 | 17.65 | 28.24 | 70.61
Over 2350 | 1.47 | 3.68 | 18.42 | 29.47 | 73.68

Specify Air Express — Better Business Buy Than Ever

Shipments go everywhere at the speed of flight between principal U. S. towns and cities, with cost including special pick-up and delivery. Same-day delivery between many airport towns and cities. Fastest air-rail service to and from 23,000 off-airline points in the U. S. Service direct by air to and from scores of foreign countries in the world's best planes — manned by the world's best crews — giving the world's best service.

AIR EXPRESS

GETS THERE FIRST

Write Today for new Time and Rate Schedule on Air Express. It contains illuminating facts to help you solve many a shipping problem. Air Express Division, Railway Express Agency, 230 Park Avenue, New York 17. Or ask for it at any Airline or Railway Express office.

Phone AIR EXPRESS DIVISION, RAILWAY EXPRESS AGENCY
Representing the AIRLINES of the United States

Equipment Men in the News

Patterson Heads Tulsa Chamber of Commerce

Nathan R. Patterson, president of Patterson Steel Co., has been elected president of the Tulsa Chamber of Commerce. Patterson, past-president of the Central Fabricators Association of Chicago, is a member of the Employers - Employes Committee of the National Association of Manufacturers. He is a director of the American Institute of Steel Construction of New York, Oklahoma Society of Professional Engineers, and Construction League. Patterson, with two brothers, formed Patterson Steel Co. in 1918, since which time it has been engaged in the design and construction of steel buildings, fabrication of structural steel, manufacturing of special items and the distribution of steel warehouse stocks for the oil industry.

Woody Named Franks Vice President

W. B. WOODY

W. B. Woody, for 9 years chief engineer of Franks Manufacturing Corp., Tulsa, has been elected vice president in charge of engineering, Carl White, Jr., Franks president announces. Joining the Franks organization in December of 1936, Woody immediately assumed charge of the engineering department, then in its initial development. Woody has had a hand in a number of the outstanding developments in oil-field equipment, including the complete rotary drilling unit mounted on a truck. Also coming under his jurisdiction was the first Franks skid drilling rig designed with a derrick.

Hammer and Cook Make Mid-Continent Trip

Otto Hammer and Bob Cook, vice presidents of Security Engineering Co., Inc., recently made a field survey and sales trip

OTTO HAMMER

BOB COOK

of the Mid-Continent and Gulf Coast areas. The men both attended the Dresser Industries general sales meeting at Mineral Springs, Tex.

Marchuk Promoted by Athey

Athey Products Corp. of Chicago has announced the appointment of A. T. Marchuk as production manager. Marchuk has served in the shipping and receiving department, as traffic manager, as supervisor of the order department, in the sales department, and as controller of sales and production schedules.

Wilson Rejoins Firm After Army Service

W. A. "Bill" Wilson has returned to Web Wilson Oil Tools after 3½ years of service in the Ordnance department of the U. S. Army. He will be in charge of new development work, engineering, design, and manufacturing, and the company will soon announce several new items of interest to the users of oil-well drilling equipment.

Edward Appoints Pool to Experimental Research Position

E. B. Pool, for 10 years a mechanical and experimental engineer with Chrysler Corp., has been appointed to conduct a new type of valve-research work by Edward Valves, Inc., East Chicago, Ind. The appointment was announced by L. H. Carr, director of research. Pool will specialize in stress and strain experiments and pioneering investigations in flow characteristics and pressure drop in addition to other mechanical and metallurgical research work.

Finn Made Worthington Export Manager

W. A. Finn has been appointed export manager of Worthington Pump & Machinery Corp. having just been released from the U. S. Navy. He succeeds George Gellhorn who has accepted a position of general manager of C. E. Halaby, one of Worthington's industrial machinery dealers in Colombia, South America. Before the war, Finn was manager of Worthington's Boston district office. His new headquarters will be in Harrison, N. J.

J. J. Lowe Back With American Mfg. Co.

After 4 years of active duty with the Navy in European and Pacific areas, James J. Lowe, former lieutenant, U.S.N.R., has rejoined the sales staff of American Manufacturing Co., Brooklyn. In addition to field sales work, Lowe will direct the company's advertising activities.

Noble Rejoins Union Wire Rope

Ray G. Noble, former Kansas University basketball star, has returned to his old duties as advertising manager for Union Wire Rope Corp. after 3 years' service with the U. S. Army. He had been with the company 5 years before his entrance into armed service.

Lane Transferred to New York: Olsen Goes to Chicago

James A. Lane, formerly stationed at the Chicago office of General American Process Equipment, has been transferred to the New York office at 420 Lexington Avenue as assistant to the sales manager.

James F. Olsen, formerly sales manager of Turbo-Mixer Corp., a unit of General American Transportation Corp., has been transferred to the Chicago office of General American Process Equipment as manager of sales.

Oklahoma Distributor for Globe Oil Tools Co. Is Named

Globe Oil Tools Co. of Los Nietos, Calif., announces the appointment of Manufacturers Warehouse Co., 1531 West Main Street, Oklahoma City, as distributor for the complete line of Globe oil tools. Orville L. Wildman, general manager for Manufacturers Warehouse Co., has just recently returned from Europe where he served in the armed forces.

Dyer Made Sales Manager Of York Supply Co.

Sam T. Dyer has been named sales manager of York Supply Co., Ltd. Dyer was graduated from St. Edwards University, Austin, in 1929, and was employed by several prominent drilling contractors. He joined Reed Roller Bit Co.'s sales department in 1937 and advanced to district sales manager in Houston. He also was foreign sales representative. He resigned the latter position to become associated with York.

Continental Makes Four Personnel Changes

Announcement has been made by the Continental Supply Co. of four personnel changes effective March 1.

C. N. SWANSON

R. A. BREWER

C. N. Swanson has been appointed director of purchases, succeeding R. L. Middleton who recently resigned. He will be connected with the company's general offices in Dallas.

T. D. COLLINS

J. R. CHAPMAN

R. A. Brewer is the newly named district manager of the Kansas-Oklahoma district. T. D. Collins succeeds to management of the North and West Texas-New Mexico district, and J. R. Chapman has been made district manager of the Rocky Mountain district.